SCITECH FORUM

6–10 JANUARY 2020 | ORLANDO, FL

DRIVING AEROSPACE SOLUTIONS FOR
GLOBAL CHALLENGES

What's going on in
the HUB
Page 25

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#aiaaSciTech

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NETWORK NAME: **SciTech**
PASSWORD: **2020scitech**

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The American Institute of Aeronautics and Astronautics (AIAA) is the world's largest aerospace technical society. With nearly 30,000 individual members from 85 countries, and 95 corporate members, AIAA brings together industry, academia, and government to advance engineering and science in aviation, space, and defense. For more information, visit aiaa.org, or follow us on Twitter @AIAA.

TECHNICAL PROGRAM COMMITTEE

FORUM TECHNICAL CHAIRS

Brett Bednarcyk, NASA Glenn Research Center

Haoxiang Luo, Vanderbilt University

Mahyar Malekpour, NASA Langley Research Center

FORUM DEPUTY TECHNICAL CHAIRS

Paul Taylor, Gulfstream Aerospace Corporation

Brian McGrath, Johns Hopkins University Applied Physics Laboratory

Thomas Lombaerts, NASA Ames Research Center

TECHNICAL DISCIPLINE CHAIRS

ADAPTIVE STRUCTURES
Roeland De Breuker, Delft University of Technology

AEROACOUSTICS
Jason Anderson, Naval Surface Warfare Center, Carderock Division

AERODYNAMIC MEASUREMENT TECHNOLOGY
Taka Sakaue, University of Notre Dame

AEROSPACE EDUCATION
Raymond P. LeBeau Jr., Saint Louis University

AIRCRAFT DESIGN
Imon Chakraborty, Auburn University

APPLIED AERODYNAMICS
Jim Coder, University of Tennessee

ATMOSPHERIC AND SPACE ENVIRONMENTS
Dale C. Ferguson, Air Force Research Laboratory

ATMOSPHERIC FLIGHT MECHANICS
Zachary R. Putnam, University of Illinois at Urbana-Champaign

COMMUNICATIONS SYSTEMS
Daniel Raible, NASA Glenn Research Center

COMPUTER SYSTEMS
Rick Tuggle, PeopleTec

DESIGN ENGINEERING
Kyle Benson, Raytheon Missile Systems

DIGITAL AVIONICS
Maarten Uijt de Haag, Technical University of Berlin

DIGITAL ENGINEERING
Mat French, Rolls-Royce

FLUID DYNAMICS
Albert Medina, Air Force Research Laboratory

GAS TURBINE ENGINES
Gaurav Kumar, Convergent Science Inc.

GREEN ENGINEERING
Tarek Abdel-Salam, East Carolina University

GROUND TESTING
Wesley M. Cobb

GUIDANCE, NAVIGATION, AND CONTROL
John M. Carson III, NASA Johnson Space Center

HIGH-SPEED AIR-BREATHING PROPULSION
Bayindir H. Saracoglu, von Karman Institute for Fluid Dynamics

HISTORY
Richard Hallion

INFORMATION AND COMMAND AND CONTROL SYSTEMS
Jimmie McEver, Johns Hopkins University Applied Physics Laboratory

INLETS, NOZZLES, AND PROPULSION SYSTEMS INTEGRATION
Darrell Crowe, Air Force Research Laboratory

INTELLIGENT SYSTEMS
Julie A. Shah, Massachusetts Institute of Technology

MATERIALS
Evan Pineda, NASA Glenn Research Center

MESHING, VISUALIZATION, AND COMPUTATIONAL ENVIRONMENTS
Nick Wyman, Pointwise, Inc.

MODELING AND SIMULATION TECHNOLOGIES
James B. Pettengill, The Boeing Company

MULTIDISCIPLINARY DESIGN OPTIMIZATION
Josh Deaton, Air Force Research Laboratory

NON-DETERMINISTIC APPROACHES
Benjamin Smarslok, Air Force Research Laboratory

PLASMADYNAMICS AND LASERS
Chris Limbach, Texas A&M University

PRESSURE GAIN COMBUSTION
Kareem Ahmed, University of Central Florida

PROPELLANTS AND COMBUSTION
Adam Steinberg, Georgia Institute of Technology

SENSOR SYSTEMS AND INFORMATION FUSION
Kent R. Engebretson, Lockheed Martin Corporation

SMALL SATELLITES
Jeremy Straub, North Dakota State University

SOCIETY AND AEROSPACE TECHNOLOGY
Matthew Kuester, Virginia Polytechnic Institute and State University

SOFTWARE
Jim Murphy, NASA Ames Research Center

SPACE EXPLORATION
Surendra Sharma, NASA Ames Research Center

SPACE FLIGHT MECHANICS
Jennifer Hudson, Western Michigan University

SPACE OPERATIONS AND SUPPORT
Jillian Redfern, Southwest Research Institute

SPACECRAFT STRUCTURES
Hazem Soliman, SOLIENG, Inc.

STRUCTURAL DYNAMICS
Eric L. Blades, ATA Engineering, Inc.

STRUCTURES
Vipul Ranatunga, Air Force Research Laboratory

SURVIVABILITY
William Schonberg, Missouri University of Science & Technology

SYSTEMS ENGINEERING
John C. Hsu, California State University, Long Beach

TERRESTRIAL ENERGY
S.A. Sherif, University of Florida

THERMOPHYSICS
William Tsai, CSU Maritime Academy

UNIQUE AND TRANSFORMATIONAL FLIGHT
Anthony Linn, A. B. Linn P.E.

UNMANNED SYSTEMS
Michael Logan, NASA Langley Research Center

WIND ENERGY
Eliot Quon, National Renewable Energy Laboratory

YOUNG PROFESSIONAL CHAIR

Tejas Girish Puranik, Georgia Institute of Technology

WELCOME TO

SCITECH FORUM

The 2020 AIAA SciTech Forum Executive Steering Committee welcomes you to Orlando! We have worked hard this past year curating exciting and thought-provoking content around the forum theme, **Driving Aerospace Solutions for Global Challenges**. We hope these industry leaders, topics, and discussions inspire you. Make it a great week!

EXECUTIVE STEERING COMMITTEE

2020 AIAA SciTech Forum

Michael Gazarik
Ball Aerospace
(Forum General Chair)

Laurette Lahey
The Boeing Company

Michele Miller
Ball Aerospace
(Deputy Forum 360 Chair)

Scott Palo
University of Colorado Boulder

Nelson Pedreiro
Lockheed Martin Space

Amy Pritchett
Pennsylvania State University

Rickey Shyne
NASA Glenn Research Center

Anthony Washburn
NASA Langley Research Center
(Forum 360 Chair)

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FORUM OVERVIEW

	SAT. 4	SUN. 5	MONDAY 6	TUESDAY 7
0730 hrs			Speaker Briefing	Speaker Briefing
0800 hrs	Continuing Education Courses and Workshops *0800–1700 hrs* *Saturday and Sunday*		Plenary	Plenary
0830 hrs				
0900 hrs			Networking Break	Networking Break
0930 hrs			Technical Sessions	Technical Sessions
1000 hrs				
1030 hrs				
1100 hrs				
1130 hrs			Forum 360	Forum 360
1200 hrs				
1230 hrs			Durand Lecture for Public Service and Lunch Reception *Sponsored by Lockheed Martin Corporation*	Networking Lunch – Taco Tuesday!
1300 hrs				Exposition Hall Open *1300–1600 hrs*
1330 hrs			Networking Lunch on Own	
1400 hrs			Technical Sessions / Forum 360	Dedicated Time for Activities in the HUB
1430 hrs				RLA Speed Mentoring / Technical Sessions / Forum 360
1500 hrs		Ignite the "Meet"ing		Networking Break in Exposition Hall *1530–1600 hrs*
1530 hrs			Networking Break	
1600 hrs				
1630 hrs		Meet the Employers *1645–1830 hrs*		
1700 hrs				
1730 hrs			Rising Leaders In Aerospace Networking Reception	Welcome Happy Hour in the Exposition Hall
1800 hrs			Associate Fellows Induction Ceremony and Reception	
1830 hrs		Student Welcome Mixer *All registered students welcome*		
1900 hrs			AIAA Young Professionals and Student Trivia Night *Hosted by AIAA Membership*	Dinner on Own
1930 hrs		SciTech 101		
2000 hrs				
2030 hrs				

GROW Technical Career Development

CONNECT Networking

EXPLORE the HUB & Exposition

DISCOVER High Level

DEVELOPMENT Student & Young Professionals

FORUM OVERVIEW

	WEDNESDAY 8	THURSDAY 9	FRIDAY 10
0730 hrs	Speaker Briefing	Speaker Briefing	Speaker Briefing
0800 hrs	Plenary	Plenary	Plenary
0830 hrs			
0900 hrs	Networking Break in Exposition Hall	Networking Break in Exposition Hall	Networking Break
0930 hrs	Technical Sessions; Forum 360; Exposition Hall Open *0845–1600 hrs*	Technical Sessions; Forum 360; Exposition Hall Open *0845–1400 hrs*	Technical Sessions; Forum 360
1000 hrs			
1030 hrs			
1100 hrs			
1130 hrs			
1200 hrs		RLA Lunch Panel: *Dawning of the Age of Intel-ligent Machines and the Future Workforce*	
1230 hrs	Luncheon in Exposition Hall	SciTech Forum Awards Luncheon	Networking Lunch on Own
1300 hrs			
1330 hrs			Technical Sessions
1400 hrs	Dedicated Time for Activities in the HUB	Technical Sessions; Forum 360	
1430 hrs	Technical Sessions; Forum 360 *In Partnership with the RLA*		
1500 hrs			
1530 hrs	Networking Break in Exposition Hall *1530–1600 hrs*	Networking Break	Networking Break
1600 hrs			
1630 hrs	Engineering Apollo		
1700 hrs		Women at SciTech Social Hour and Keynote	
1730 hrs			
1800 hrs	Dryden Lecture in Research		
1830 hrs			
1900 hrs			
1930 hrs			
2000 hrs			
2030 hrs			

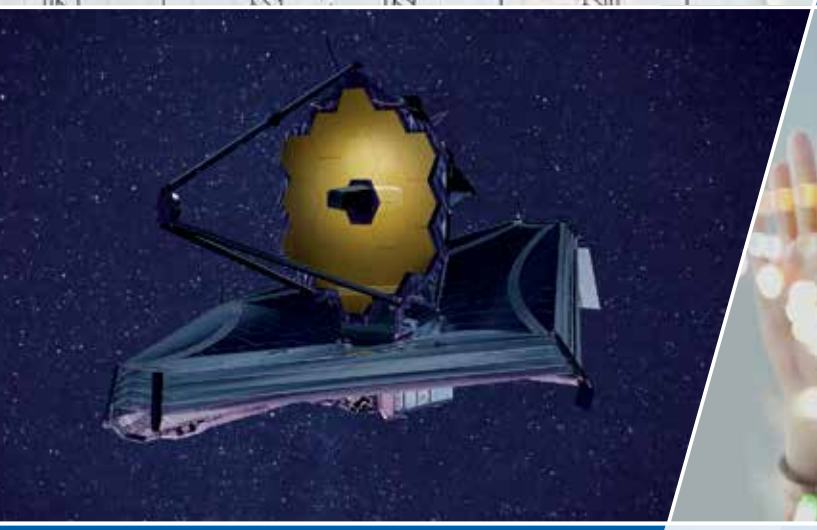
GROW Technical Career Development

CONNECT Networking

EXPLORE the HUB & Exposition

DISCOVER High Level

DEVELOPMENT Student & Young Professionals



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PRE-FORUM ACTIVITIES

CONTINUING EDUCATION OFFERINGS

Stay at the top of your game with AIAA's continuing education offerings. You will leave with invaluable knowledge and solutions that you can put to immediate use.

COURSES & WORKSHOPS

SAT. 4 – SUN. 5 JANUARY

0800–1700 HRS — MANATEE SPRING II

Design of Electrified Propulsion Aircraft (*2 Days*)
Participants will learn how to design electrified propulsion aircraft starting from the top-level aircraft requirements. Design examples will include electric and hybrid-electric aircraft of various sizes and missions.

0800–1700 HRS — CORAL SPRING II

Design of Experiments: Improved Experimental Methods in Aerospace Testing (*2 Days*)
This course details a formal approach to experiment design to ensure empirical model adequacy, quantify variability in predictions, and identify all possible independent variable interactions.

0800–1700 HRS — BARREL SPRING I

Fundamentals of Drones: UAV Concepts, Designs and Technologies (*2 Days*)
This new course introduces the concepts, design, and technologies of fixed-wing and multirotor unmanned aerial vehicles (UAVs), or commonly known as drones.

0800–1700 HRS — CORAL SPRING I

Integrated CubeSat Engineering (*2 Days*)
This two-day course examines the application of systems engineering tools and techniques that will provide participants with an understanding of requirements necessary to plan a credible CubeSat Development Program.

0800–1700 HRS — PEACOCK SPRING

Integrating Program Management, Systems Engineering, and Six Sigma (*2 Days*)
Learn how to apply systems engineering processes, tools, and techniques with program management's organizing and staffing, planning, performance measurement, decision, and cost control; includes EVMS and Six Sigma.

0800–1700 HRS — BARREL SPRING II

Missile Guidance (*2 Days*)
This course provides a system-level, integrated method for missile guidance design, development, and system engineering activities in addressing requirements such as performance, cost, risk, and system integration.

0800–1700 HRS — ROCK SPRING I & II

Systems Thinking for Modern Aerospace Complexity (*2 Days*)
This comprehensive course covers systems thinking for addressing complexity in the development of modern aerospace systems.

0800–1700 HRS — MANATEE SPRING I

3rd AIAA Sonic Boom Prediction Workshop (*2 Days*)
This two-part workshop will cover both the state of the art for predicting near-field sonic boom signatures with CFD as well as propagation of the near-field pressures to the ground.

SUNDAY 5 JANUARY

0800–1700 HRS — CELEBRATION 14 & 15

75+ Years of Hypersonics Development: History, Resources, References, and Insights (*1 Day*)
This course is designed to touch on many of the key developments in the past and provide references and resources to learn more about this history.

0800–1700 HRS — CELEBRATION 13

A Unified Approach for Computational Aeroelasticity (*1 Day*)
This course covers concepts and terminology associated with aeroelasticity, including structural dynamics, unsteady aerodynamics, aeroservoelasticity, and recent developments such as computational reduced-order models

0800–1700 HRS — CELEBRATION 11

Additive Manufacturing: Structural and Material Optimization (*1 Day*)
This course will provide a practical understanding of topology optimization and additive manufacturing.

0800–1700 HRS — CELEBRATION 12

Introduction to Digital Engineering (*1 Day*)
This one-of-a-kind course is at the leading edge of the rapidly emerging field of digital engineering.

STUDENT WELCOME DAY ACTIVITIES

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SUNDAY 5 JANUARY

1500–1630 HRS — **REGENCY BALLROOM O&P**

Ignite the "Meet"ing

Nothing can be more intimidating than being a newcomer or young person at a conference or event where everyone already knows one another! Learn tips and techniques on networking and relationship building that will make your forum experience more enjoyable and productive. The session will focus on creating an introduction, understanding how to engage with others, playing off the unique networking styles of introverts and extroverts, and some "dos and don'ts" of networking. Then participants will take part in an activity designed to foster quick friendships so they never enter a forum session or reception feeling like a stranger.

1645–1830 HRS — **ORLANDO BALLROOM M&N**

Meet the Employers Recruiting Event

AIAA's recruiting event brings together corporate members and students/young professional attendees. This fun and dynamic environment allows students and professionals to interact with organizations regarding employment opportunities. Participating companies/organizations will present an organizational overview and opportunities available, then have follow-on discussions with the attendees.

1830–1930 HRS — **REGENCY BALLROOM O&P**

Student Welcome Mixer

AIAA SciTech Forum has one of the largest gatherings of students of any of the AIAA forums. Mingle with your peers and hear from AIAA leadership. This reception provides you with the opportunity to meet your fellow students and learn more about the opportunities available to you as an AIAA student member. Games, entertainment, and light fare will be provided! A cash bar will be available to students age 21 and over with a valid ID. (Proof of student registration required.)

1930–2000 HRS — **REGENCY BALLROOM Q**

SciTech 101 – A First-Time Attendee Guide to the Forum

Discover how you can make the most of your week at AIAA SciTech Forum while meeting fellow attendees. This orientation is ideal for first-time attendees, but all are welcome!

PLENARY & FORUM 360 SESSIONS

MONDAY, 6 JANUARY

0800–0900 HRS WINDERMERE BALLROOM

Using Space to Support a Sustainable Society

MODERATOR: Amy Pritchett, Professor and Head, Department of Aerospace Engineering, Pennsylvania State University

KEYNOTE: Danielle Wood, Director, Space Enabled Research Group, MIT Media Lab, and Assistant Professor, Media Arts & Sciences and Aeronautics and Astronautics, Massachusetts Institute of Technology

FORUM 360° 0930–1130 HRS REGENCY BALLROOM Q

Achieving Sustainable Aviation

MODERATOR: Graham Warwick, Technology Executive Editor, Aviation Week & Space Technology

PANELISTS:
Brian German, National Institute of Aerospace Langley Associate Professor, Georgia Institute of Technology

James Hileman, Chief Scientific and Technical Advisor, Environment and Energy, FAA

Michael Winter, Senior Fellow, Advanced Technology, Pratt & Whitney

Jeanne Yu, Director, Technology Integration, ecoDemonstrator Program, The Boeing Company

Thomas Zill, Head, Air Vehicle Concepts, Institute for System Architectures in Aeronautics

FORUM 360° 1400–1600 HRS REGENCY BALLROOM Q

Aerospace Innovation Enables Resilient Communities

MODERATOR: Allie Braun, Communications, Earthrise Alliance

PANELISTS:
Gijs de Boer, Research Scientist III, Cooperative Institute for Research in Environmental Sciences, University of Colorado and NOAA Physical Sciences Division

Mark Mozena, Senior Director, Government Affairs, Planet

John Murray, Associate Program Manager, NASA Earth Science Disasters Program, NASA Langley Research Center

Rhiannan Price, Director, Sustainable Development Practice, Maxar Technologies

TUESDAY, 7 JANUARY

0800–0900 HRS WINDERMERE BALLROOM

The Next Giant Leap

MODERATOR: Nelson Pedreiro, Vice President, Advanced Technology Center, Lockheed Martin Space

KEYNOTE: Robert Lightfoot, Vice President, Strategy and Business Development, Lockheed Martin Space

FORUM 360° 0930–1130 HRS REGENCY BALLROOM Q

AI in Emerging Aerospace Manufacturing

MODERATOR: Emilie "Mia" Siochi, Senior Scientist, Advanced Materials Processing Branch, NASA Langley Research Center

PANELISTS:
Miranda Jones, Manager, Business Analytics, Spirit AeroSystems

Justin Kugler, Vice President, Advanced Programs and Concepts, Made in Space

Andrew Kwas, NG Fellow, Engineering Systems Architect, Northrop Grumman Corporation

Wesley Smith, Digital Transformation Leader, Lockheed Martin Fellow, Lockheed Martin Corporation

Tia Benson Tolle, Director, Materials and Fabrication, Boeing Commercial Airplanes

FORUM 360° 1430–1630 HRS REGENCY BALLROOM Q

Is Hypersonic Flight the Next Big Thing?

MODERATOR: Martiqua Post, Professor of Aeronautics, U.S. Air Force Academy

PANELISTS:
Frank D. Boensch, X-30 (NASP) Joint Program Office: Deputy Director, Airframe, and Director of Consortia and Technology, Air Force Flight Dynamics Laboratory (ret.)

Mark Lewis, Director, Defense Research and Engineering for Modernization, Office of the Secretary of Defense

Charles McClinton, Hypersonic Technology Manager, NASA (ret.)

Richard Mutzman, Chief Engineer, Aerospace Systems Directorate, Air Force Research Laboratory (ret.)

David Van Wie, Head, Air and Missile Defense Sector, Johns Hopkins University Applied Physics Laboratory

Join the Q&A at aiaa.cnf.io

PLENARY & FORUM 360 SESSIONS

WEDNESDAY, 8 JANUARY

0800–0900 HRS WINDERMERE BALLROOM

Igniting Tomorrow: Stories from America's Favorite Museum

MODERATOR: Michael Gazarik, Vice President, Engineering, Ball Aerospace

KEYNOTE: Ellen R. Stofan, John and Adrienne Mars Director, National Air and Space Museum, Smithsonian Institution

FORUM 360°

0930–1130 HRS REGENCY BALLROOM Q

Connecting Faster

MODERATOR: Ed Waggoner, Director, Integrated Aviation Systems Program, Aeronautics Research Mission Directorate, NASA

PANELISTS:

Erik Axdahl, Chief Engineer, High Speed Transport, The Spaceship Company

Kevin Bowcutt, Senior Technical Fellow, Chief Scientist of Hypersonics, The Boeing Company

Stephen Frick, Director of Operations, Company Advanced Technology Center, Lockheed Martin Space

Eric Kaduce, Director, Boeing/Aerion Supersonic Business Jet Joint Venture, The Boeing Company

AJ Piplica, Chief Executive Officer and Founder, Hermeus

Joe Wilding, Chief Technology Officer and Co-Founder, Boom Technology, Inc.

FORUM 360° RISING LEADERS IN AEROSPACE

1430–1630 HRS REGENCY BALLROOM Q

Idea Challenge

MODERATOR: Michele Miller, Ball Aerospace

TEAM ORBIS:
Elizabeth Balga, The Boeing Company
Jannine Rouw, Ball Aerospace
Margaret Shaw-Lecerf, Lockheed Martin Corporation
Katrina Teo, University of Washington

TEAM THE PANGEA PROJECT:
Emily Flaherty-Woods, Collins Aerospace
Nathaniel Keyek-Franssen, The Boeing Company
Conner Knickel, Ball Aerospace
Trevor Perkins, Lockheed Martin Corporation

TEAM HELIOS:
Amanda Ireland, The Boeing Company
Christopher Rouw, Ball Aerospace
Joseph Schmitz, Lockheed Martin Corporation

TEAM SLINGSHOT:
Jason Gardellis, Rolls-Royce Corporation
Amani Garvin, Ball Aerospace
Anjaney Kottapalli, Lockheed Martin Company
Brandon Smith, The Boeing Company

TEAM ASTRO:
Lyndy Axon, The Boeing Company
Karenna Buco, Aerojet Rocketdyne
Becky Mitchell, Lockheed Martin Corporation
Karen Rucker, Ball Aerospace

TEAM SWARM:
Barndon Burroughs, The Boeing Company
Heather Kline, NASA Langley Research Center
Matthew Marcus, NASA Goddard Space Flight Center
Taylor Zedosky, Ball Aerospace

PLENARY & FORUM 360 SESSIONS

THURSDAY, 9 JANUARY

0800–0900 HRS WINDERMERE BALLROOM

Engineers Build the World

MODERATOR: Laurette Lahey, Director, Flight and Vehicle Technology, Boeing Research & Technology

KEYNOTE: Lori Garver, Chief Executive Officer, Earthrise Alliance

FORUM 360° 0930–1130 HRS REGENCY BALLROOM Q

The Next Challenge for Aerospace: Global Climate Change

MODERATOR: John Tylko, Chief Innovation Officer, Aurora Flight Sciences

PANELISTS:

James G. Anderson, Philip S. Weld Professor of Atmospheric Chemistry, Harvard University

Philippe Bonnefoy, Founder & Principal, BlueSky

R. John Hansman, T. Wilson Professor of Aeronautics and Astronautics, Massachusetts Institute of Technology

FORUM 360° 1400–1600 HRS REGENCY BALLROOM Q

High Performance Computing's Impact on Aerospace Prediction

MODERATOR: Jeffrey Slotnick, Technical Fellow, Flight Sciences, Boeing Commercial Airplanes

PANELISTS:

Roy Campbell, Chief Scientist, High Performance Computing Modernization Program, Department of Defense

Douglas Kothe, Director, Exascale Computing Project, Oak Ridge National Laboratory

Scott Morton, DoD HPCMP CREATE-AV Project Manager, U.S. Army Engineering Research and Development Center

Eric Nielson, Senior Research Scientist, Computational AeroSciences Branch, NASA Langley Research Center

FRIDAY, 10 JANUARY

0800–0900 HRS WINDERMERE BALLROOM

Multi-Use Aerospace Technologies

INTRODUCTION: Rickey Shyne, Director, Research and Engineering, NASA Glenn Research Center

MODERATOR: Woodrow Whitlow Jr., Technical Director, National Aerospace Solutions, LLC

KEYNOTE: Wesley Harris, C.S. Draper Professor of Aeronautics and Astronautics, Massachusetts Institute of Technology

FORUM 360° 0930–1130 HRS REGENCY BALLROOM Q

Wow! Look at What We Discovered: Impacts of Multiple Use Aerospace Technology

MODERATOR: John M. Sankovic, President & CEO, Ohio Aerospace Institute

PANELISTS:

Zarrin Chua, Human Factors Engineer, Aurora Flight Sciences

Narendra Joshi, Chief Scientist, Advanced Propulsion Technologies, GE Research

Michael "Pappy" Penland, Principal Director, Operational Energy Policy and Chief of Staff, Office of the Deputy Assistant Secretary of the Air Force, Operational Energy

John Stetson, Senior Technical Fellow, Lockheed Martin Corporation

OUR INDUSTRY IS EVOLVING

AIAA events tackle the most pressing issues impacting the future of aerospace.

AIAA DEFENSE Forum
5–7 May 2020
Laurel, Maryland
aiaa.org/defense

AIAA AVIATION Forum
15–19 June 2020
Reno, Nevada
aiaa.org/aviation

AIAA Propulsion and Energy Forum
24–26 August 2020
New Orleans, Louisiana
aiaa.org/propulsionenergy

ASCEND
16–18 November 2020
Las Vegas, Nevada
www.ascend.events

AIAA
SHAPING THE FUTURE OF AEROSPACE

RISING LEADERS IN AEROSPACE

This multidimensional program features speed mentoring, panel session, Q&A with top industry leaders, and multiple opportunities for networking. These exciting and energetic activities will provide access to top aerospace leaders and their perspectives, with subject matter relevant to your career stage.

MONDAY, 6 JANUARY

1730–1900 HRS **REGENCY BALLROOM O&P**

Rising Leaders in Aerospace Reception

Network with fellow young professionals and plan for the week ahead. You'll come away with at least a handful of new contacts, connections, and support.

TUESDAY, 7 JANUARY

1430–1600 HRS **REGENCY BALLROOM O&P**

Speed Mentoring

Leaders in the aerospace industry will take time to meet with the Rising Leaders participants and share their experiences. This event is a great way to get insight and make new contacts.

WEDNESDAY, 8 JANUARY

1300–1400 **WINDERMERE BALLROOM**

Enabling the Future of Aviation

Come hear Jay Dryer, Deputy Associate Administrator for Programs, NASA Aeronautics Research Mission Directorate, speak about NASA's vision for aeronautics and the leadership/strategy of aeronautics in an R&D organization. This session is part of the IFAR Virtual Exchange series.

FORUM 360°

1430–1630 HRS **REGENCY BALLROOM Q**

Idea Challenge

MODERATOR: Michele Miller, Ball Aerospace

See page 14 for list of all participants.

THURSDAY, 9 JANUARY

1200–1400 HRS **REGENCY BALLROOM O&P**

Lunch Panel: Dawning the Age of Intelligent Machines and the Future Workforce

Humans have progressed from the information age to the dawning of the intelligent machines age. What is the anatomy of this new world? What are the issues and challenges and constraints? How do we prepare the workforce for this exciting new age?

MODERATORS:

Tom Shih, Professor and Head of Aeronautics and Astronautics, Purdue University

Tejas Girish, Georgia Institute of Technology

PANELISTS:

Ella Atkins, Professor, University of Michigan

Martial Hebert, Dean of the School of Computer Science, Carnegie Mellon University

Michael Francis, Colonel, U.S. Air Force (ret.)

TUESDAY, 7 JANUARY

1730–1900 HRS **EXPOSITION HALL**

Welcome Happy Hour

Take this opportunity to engage new contacts and refresh old ones. Proof of purchase for this event is required and included in the registration fee where indicated. Admission for guests may be purchased upon registration or on site, as space is available.

NEW THIS YEAR: All students are welcome to attend!

Supported by AIAA Corporate Partners:

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SPECIAL PROGRAMMING

MONDAY, 6 JANUARY

0930–1230 HRS	Masters Category	COLUMBIA 35
0930–1200 HRS	Team Category	COLUMBIA 36
0930–1300 HRS	Undergraduate Category	COLUMBIA 37

International Student Conference

The first-place winners of the AIAA Regional Student Conferences will gather to present their research to a team of judges made up of professional members in the industry. The students will have three consecutive sessions in the categories of Undergraduate, Masters, and Team.

1900–2100 HRS — REGENCY BALLROOM O&P

Young Professionals and Student Trivia Night

What percent of the universe is dark matter? What are the main parts of a comet? Take trivia to a new altitude with AIAA! Join us for a night of fun and compete for prizes with other students and young professionals. Light snacks and desserts will be provided. Each player will also be provided one drink ticket. Boost your chances of winning by bringing your friends and forming a team.

WEDNESDAY, 8 JANUARY

1300–1400 — WINDERMERE BALLROOM

Enabling the Future of Aviation

Come hear Robert (Bob) Pearce, Associate Administrator for NASA's Aeronautics Research Mission Directorate (ARMD), speak about NASA's vision for aeronautics and the leadership/strategy of aeronautics in an R&D organization. This session is part of the IFAR Virtual Exchange series.

1630–1800 HRS — WINDERMERE BALLROOM

Engineering Apollo: Flight Simulation

MODERATOR: John Tylko, Chief Innovation Officer, Aurora Flight Sciences

PANELISTS:
Frank Hughes, President, Tietronix; and Chief, Space Flight Training, NASA (ret.)

Wayne Ottinger, President, Aerospace Legacy Engineering & Technology Recovery Organization; and Lunar Landing Training Vehicle Technical Director and Base Manager, NASA (ret.)

Col. David R. Scott, USAF (ret.), NASA Astronaut on Gemini VIII, Apollo 9, and Apollo 15

THURSDAY, 9 JANUARY

1700–1900 HRS — REGENCY BALLROOM Q

Women at SciTech Keynote: Listening to – and Trusting – the Voice Inside

KEYNOTE: Mary Lynne Dittmar, President and CEO, Coalition for Deep Space Exploration

The Women at SciTech Social Hour and Keynote is a special programming event which will provide all attendees an opportunity to discuss experiences and celebrate women who are leaders in their fields.

RECOGNITION AND LECTURES

Join us at the 2020 AIAA SciTech Forum as we recognize the very best in our industry – those individuals and teams who have taken aerospace technology and discovery to the next level. These remarkable individuals have leveraged their expertise for the benefit of society. Their achievements have inspired us to dream and to explore new frontiers.

MONDAY, 6 JANUARY

1230–1400 HRS WINDERMERE BALLROOM

Durand Lecture for Public Service and Lunch Reception

SPEAKER: Robert D. Braun, University of Colorado Boulder

Space Technology: An Investment in Our Future

The Durand Lecture, named in honor of William F. Durand, is presented to showcase notable achievements by a scientific or technical leader whose contributions have led directly to the understanding and application of the science and technology of aeronautics and astronautics for the betterment of mankind. A lunch will be offered to 225 guests on a first-come, first-served basis. The lecture will be presented after lunch and is open to all attendees at that time.

Sponsored by: LOCKHEED MARTIN

1800–2030 HRS WINDERMERE BALLROOM

AIAA Associate Fellows Induction Ceremony and Reception *(Proof of Purchase Required)*

Each year, the Institute recognizes exemplary professionals for their accomplishments in engineering or scientific work, outstanding merit and contributions to the art, science, or technology of aeronautics or astronautics. Please support your colleagues and join us for the induction of the 2020 Associate Fellows. Admission to this celebrated event is available on a first-come, first-served basis and can be purchased for $85 via the AIAA SciTech Forum registration webpage, or onsite (based on availability).

TUESDAY, 7 JANUARY

0930–1100 HRS ORCHID ROOM

Student Awards Breakfast

SPEAKER: JD McFarlan, Vice President, Functional Engineering, Lockheed Martin Aeronautics

After hearing from guest speaker, JD McFarlan, the International Student Conference winners from each category will be announced, and the Abe M. Zarem Award winners will be recognized. *This is an invite-only event.*

ABE M. ZAREM AWARD FOR DISTINGUISHED ACHIEVEMENT IN AERONAUTICS
Cole Anderson, Oregon State University
Roberto Albertani, Oregon State University

ABE M. ZAREM AWARD FOR DISTINGUISHED ACHIEVEMENT IN ASTRONAUTICS
Johnie Sublett, Georgia Institute of Technology
Dimitri Mavris, Georgia Institute of Technology

Sponsored by: LOCKHEED MARTIN

WEDNESDAY, 8 JANUARY

1800–1900 HRS REGENCY BALLROOM Q

Dryden Lecture in Research

SPEAKER: Raphael T. Haftka, University of Florida

Evolution of Optimization, Experiments, and Uncertainty Quantification with Increasing Computing Power

The Dryden Lecture in Research was named in honor of Dr. Hugh L. Dryden in 1967, succeeding the Research Award established in 1960. The lecture emphasizes the great importance of basic and applied research to the advancement in aeronautics and astronautics and is a salute to research scientists and engineers. It is open to attendees and the public.

THURSDAY, 9 JANUARY

1230–1400 HRS WINDERMERE BALLROOM

SciTech Forum Awards Luncheon

We honor our up-and-coming students, our technical innovators, and our seasoned practitioners. We meet to elevate their work and encourage our community. Proof of purchase for the luncheon is required and included in the registration fee where indicated. Admission for guests may be purchased onsite at the registration desk, as space is available. Please join use as we recognize the following winners:

LITERARY AWARDS

2020 GARDNER-LASSER AEROSPACE HISTORY LITERATURE AWARD
Jeremy R Kinney, National Air and Space Museum
Reinventing the Propeller: Aeronautical Specialty and the Triumph of the Modern Airplane

2020 AIAA HISTORY MANUSCRIPT AWARD
Glen R. Asner, Office of the Secretary of Defense
Stephen J. Garber, NASA Headquarters
Manuscript: "Untethering Spaceflight: A History of U.S. Space Exploration Policy 1999-2004"

2020 AIAA PENDRAY AEROSPACE LITERATURE AWARD
Russell M. Cummings, U.S. Air Force Academy
For being the lead author on a groundbreaking undergraduate text that introduces computational fluid dynamics to aeronautical engineering students.

2020 AIAA SUMMERFIELD BOOK AWARD
Steve A. Brandt, U.S. Air Force Academy
Randall J. Stiles, Colorado College
J. Bertin
Ray Whitford
Introduction to Aeronautics: A Design Perspective, Third Edition

RECOGNITION AND LECTURES

SERVICE AWARD

2020 AIAA DIVERSITY AND INCLUSION AWARD
Charles Wilson, MIT Lincoln Laboratory (retired)
"For zealously pursuing AIAA's Diversity and Inclusion initiative, hosting special events and collaborating with organizations to promote progress in diversity for AIAA and with the AIAA New England Section team."

TECHNICAL AWARDS

2019 AIAA AERODYNAMIC MEASUREMENT TECHNOLOGY AWARD
Marcus Aldén, Lund University
For wide ranging and pioneering work in developing and applying laser diagnostic techniques, including linear and nonlinear approaches, for study of fundamental and practical combustion.

2020 AIAA DE FLOREZ AWARD FOR FLIGHT SIMULATION
Edward L. Burnett, Lockheed Martin Aeronautics (retired)
For his outstanding contributions to the nation's most advanced military aircraft through the art of modeling and simulation to enhance controllability and performance.

2020 AIAA ICME PRIZE
Will be announced at the awards luncheon.

2020 AIAA INTELLIGENT SYSTEMS AWARD
Jonathan P. How, Massachusetts Institute of Technology
For outstanding and sustained contributions to the decision making and control of intelligent autonomous aerospace vehicles.

2020 AIAA MECHANICS AND CONTROL OF FLIGHT AWARD
Christopher N. D'Souza, NASA Johnson Space Center
For seminal contributions to the theory and practice of autonomous guidance, navigation, and control of space vehicles.

2020 AIAA STRUCTURES, STRUCTURAL DYNAMICS AND MATERIALS AWARD
Stephen P. Engelstad, Lockheed Martin Aeronautics Company
For outstanding contributions as an industry leader in R&D and DOD applications of new aeronautics computational mechanics and composites structure/certification technologies.

2020 AIAA SURVIVABILITY AWARD
Charles F. Frankenberger, Naval Air Warfare Center Weapons Division
For technical and leadership excellence in propulsion system survivability enhancement and executing multi-service test programs to evaluate and improve overall aircraft survivability.

BEST PAPERS

2019 AIAA Adaptive Structures Best Paper
"Off-Design Sonic Boom Performance for Low-Boom Aircraft" (AIAA 2019-0606) by **David S. Lazzara**, **Todd Magee**, **Hao Shen**, **James H. Mabe**, Boeing Research & Technology

2019 AIAA Applied Aerodynamics Best Student Paper
"Experimental Validation of the Unsteady CFD-generated Airwake of the HMS Queen Elizabeth" (AIAA 2019-3029) by **Neale A. Watson**, **Mark D. White**, **Ieuan Owen**, University of Liverpool, United Kingdom

2019 AIAA Atmospheric and Space Environments Best Paper
"Remote Sensing of Spacecraft Potential at Geosynchronous Orbit using Secondary and Photo Electrons" (AIAA 2019-0311) by **Miles T. Bengtson** and **Hanspeter Schaub**, University of Colorado

2019 AIAA Atmospheric Flight Mechanics Best Paper
"Effects of Model Simplification on Wind Reconstruction During Open-Loop Longitudinal Flight" (AIAA 2019-1599) by **Hunter G. McClelland** and **Craig A. Woolsey**, Virginia Polytechnic Institute and State University

2020 Collier Research Hypersizer/AIAA Structures Best Paper Award
"Experimental and Numerical Study on the Low Velocity Impact Damage of a Shear Dominated Composite Laminate" (AIAA 2019-1269) by **Shiyao Lin** and **Anthony M. Waas**, University of Michigan

2019 AIAA Design Engineering Best Paper
"An Exploratory Design Tool for Lattice Airplane Wing Components" (AIAA 2019-3067) by **Patrick Riley** and **Samar Malek**, United States Naval Academy

2019 AIAA Guidance Navigation and Control Best Paper
"Vision-Based Navigation for the NASA Mars Helicopter" (AIAA 2019-1411) by **David S. Bayard**, **Dylan T. Conway**, **Roland Brockers**, **Jeff Delaune**, **Larry Matthies**, **Håvard F. Grip**, **Gene Merewether**, **Travis Brown**, **Miguel San Martin**, Jet Propulsion Laboratory

2019 AIAA High Speed Air Breathing Propulsion Best Paper
"Study of Parasitic Combustion in an Optically Accessible Continuous Wave Rotating Detonation Engine " (AIAA 2019-0473) by **Fabian Chacon** and **Mirko Gamba**, University of Michigan

2019 AIAA Modeling and Simulation Best Paper
"The Suitability of Objective Motion Criteria for Rotorcraft Manoeuvres" (AIAA 2019-0180) by **Michael Jones**, German Aerospace Center (DLR)

2019 AIAA Pressure Gain Combustion Best Paper
"Operational Stability Limits in Rotating Detonation Engine Numerical Simulations" (AIAA 2019-0748) by **Daniel Paxson**, NASA Glenn Research Center, and **Doug Schwer**, Naval Research Laboratory

2019 AIAA Sensor System and Information Fusion Best Paper
"Autonomous Wildfire Monitoring Using Airborne and Temperature Sensors in an Evidential Reasoning Framework" (AIAA 2019-2263) by **Alexander A. Soderlund**, **Mrinal Kumar**, **Chao Yang**, Ohio State University

RECOGNITION AND LECTURES

2019 Shahyar Pirzadeh Memorial Meshing Visualization and Computational Environments Best Paper Award
"Verification of Unstructured Grid Adaptation Components" (AIAA 2019-1723) by **Michael A. Park**, **Aravind Balan**, **W. Kyle Anderson**, NASA Langley Research Center; **Marshall C. Galbraith**, **Philip C. Caplan**, **Hugh A. Carson**, Massachusetts Institute of Technology; **Todd Michal**, **Joshua A. Krakos**, **Dmitry S. Kamenetskiy**, Boeing Research & Technology; **Adrien Loseille**, **Frédéric Alauzet**, INRIA Paris-Saclay; **Loïc Frazza**, Sorbonne Universités; **Nicolas Barral**, Imperial College London

2019 AIAA Spacecraft Structures Best Paper
"Analysis of the Column Bending Test for Bending of High Strain Composites" (AIAA 2019-1746) by **Ajay Sharma**, University of Colorado; **TJ Rose**, University of Colorado; **Andrew Seamone**, University of Colorado; **Thomas Murphey**, Opterus R&D; **Francisco López**, University of Colorado

BEST STUDENT PAPERS AND STUDENT PAPER COMPETITIONS

2019 AIAA Computational Fluid Dynamics Student Paper Competition

1st Place
"Sensitivity Computation of Statistically Stationary Quantities in Turbulent Flows" (AIAA 2019-3426) by **Nisha Chandramoorthy** and **Qiqi Wang**, Massachusetts Institute of Technology

2nd Place
"A Novel Flux Reconstruction Method for Diffusion Problems" (AIAA 2019-3063) by **Philip E. Johnson** and **Eric Johnsen**, University of Michigan; **H.T. Huynh**, NASA Glenn Research Center

3rd Place
"Assessment of low-dissipative shock-capturing schemes for transitional and turbulent shock interactions" (AIAA 2019-3208) by **David J. Lusher** and **Neil D. Sandham**, University of Southampton

2019 Walter R. Lempert Student Paper Award in Diagnostics for Fluid Mechanics, Plasma Physics, and Energy Transfer
"Single-Exposure Field-of-View Extension Using Multiplexed Structured Image Capture" (AIAA 2019-0832) by **Cary Smith**, **Jacob Harrold**, **Zhili Zhang**, **Mark Gragston**, University of Tennessee

2019 AIAA Atmospheric Flight Mechanics Student Paper Competition
"Beneficial Effect of the Coupled Wing-Body Dynamics on Power Consumption in Butterflies" (AIAA 2019-0566) by **Madhu Sridhar**, **Chang-kwon Kang**, **David Brian Landrum**, University of Alabama in Huntsville

2020 AIAA Meshing Visualization and Computational Sciences Best Student Paper
"Advancing Layer Surface Mesh Generation" (AIAA 2020-0902) by **Jasmeet Singh** and **Carl Ollivier-Gooch**, University of British Columbia

STUDENT COMPETITIONS

Winners Announced at the Luncheon

American Society for Composites Student Paper Award

Atmospheric Flight Mechanics Best Student Paper Competition

David P. Weaver Student Best Paper Award Student Paper Competition

Guidance, Navigation and Control Student Paper Competition

Harry H. and Lois G. Hilton Student Paper Award in Structures

Intelligent Systems Student Paper Competition

Jefferson Goblet Student Paper Award

Lockheed Martin Student Paper Award in Structures

Meshing, Visualization, and Computational Environments student paper competition

SwRI Student Paper Award in Non-Deterministic Approaches

Thermophysics Student Paper Competition

PARTNERED AWARDS

2019 JOHN LELAND ATWOOD AWARD
Azad M. Madni, Ph.D., University of Southern California
For exemplary leadership in aerospace systems engineering education and research, and for lasting contributions to the aerospace industry as thought leader, author, educator, researcher and mentor.

ASME/Boeing Structures & Materials Award
"Effect of Automated Fiber Placement (AFP) Manufacturing Signature on Mechanical Performance" (AIAA 2019-0516) by **Minh Hoang Nguyen**, University of Michigan; **Avinkrishnan Ambika Vijayachandran**, University of Michigan; **Paul Davidson**, University of Michigan; **Damon Call**, Toray Composites American; **Dongyeon Lee**, Toray Composites American; **Anthony M Waas**, University of Michigan

ASME WInd Tunnel Best Paper
Winners Announced at the Luncheon

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ONLINE LEARNING

NETWORKING EVENTS

Understanding the importance of networking with colleagues new and old, a series of activities have been planned that will help you connect with current colleagues and new acquaintances.

SUNDAY, 5 JANUARY

1400–1900 HRS — REGENCY ROTUNDA

Registration Lounge

Review the program of events, play tailgating games with fellow attendees, and plan for the week ahead while enjoying live music. (Cash bar will be available)

1930–2000 HRS — REGENCY BALLROOM Q

SciTech 101 – A First-Time Attendee Guide to the Forum

Discover how you can make the most of your week at AIAA SciTech Forum while meeting fellow attendees. This orientation is ideal for first-time attendees, but all are welcome!

MONDAY, 6 JANUARY

1730–1900 HRS — REGENCY BALLROOM Q

Technical Committee Showcase

The AIAA Technical Committee (TC) Showcase provides an opportunity for forum attendees to find out more about AIAA's TCs. The TCs are grouped into six groups under the Technical Activities Division: Aerospace Design and Structures; Aerospace Sciences; Information Systems; Propulsion and Energy; Aircraft Technology, Integration, and Operations; and Space and Missiles. Representatives from all six groups will be present to answer questions and provide personal perspectives on the value of TC membership.

TUESDAY, 7 JANUARY

1230–1400 HRS — GARDEN TERRACE (4TH FLOOR)

Taco Tuesday Networking Lunch

Build your own tacos and feast on quesadillas, empanadas, and dessert while networking with fellow attendees. *Proof of purchase is required*

1730–1900 HRS — EXPOSITION HALL

Welcome Happy Hour

Take this opportunity to engage new contacts and refresh old ones. Proof of purchase required for the reception and included in the registration fee where indicated. Admission for guests may be purchased upon registration or on site, as space is available.
NEW THIS YEAR: All students are welcome to attend!

WEDNESDAY, 8 JANUARY

1230–1400 HRS — EXPOSITION HALL

Luncheon in the Exposition Hall

Proof of purchase is required and included in the registration fee where indicated.

THURSDAY, 9 JANUARY

0930–1130 HRS — REGENCY BALLROOM O&P

Women of Aeronautics and Astronautics Networking Breakfast

The Women of Aeronautics and Astronautics, in conjunction with the Diversity Working Group, invite students and young professionals to attend a networking breakfast where you'll have the opportunity to hear introductions from all the mentors and then visit with several mentors of your choice for a deeper conversation.

1700–1900 HRS — REGENCY BALLROOM Q

Women at SciTech Keynote: Listening to – and Trusting – the Voice Inside

KEYNOTE: Mary Lynne Dittmar, President and CEO, Coalition for Deep Space Exploration

The Women at SciTech Social Hour and Keynote is a special programming event which will provide all attendees an opportunity to discuss experiences and celebrate women who are leaders in their fields.

Coffee Breaks

Coffee breaks allow even more time for making new contacts, continuing discussions from sessions, visiting the Exposition Hall, or checking emails and voicemails to keep in touch with the office while you are at the forum. Coffee breaks will be located in the following locations and times:

Monday, 6 January	0900 hrs and 1530 hrs Regency and Celebration Foyers
Tuesday, 7 January	0900 hrs Regency and Celebration Foyers 1530 hrs Exposition Hall
Wednesday, 8 January	0900 hrs and 1530 hrs Exposition Hall
Thursday, 9 January	0900 hrs Exposition Hall 1530 hrs Regency and Celebration Foyers
Friday, 10 January	0900 hrs and 1530 hrs Regency and Celebration Foyers

Stay Fit at SciTech!

Stay fit with your fellow attendees! Join AIAA staff on **Tuesday, 7 January**, and **Thursday, 9 January**, at **0600 hrs** at the Hyatt Regency Lobby, by the Concierge Desk for a run/walk. All levels are welcome for a 1-3 mile route.

EXPOSITION HALL

EXPOSITION HALL HOURS

TUESDAY, 7 JANUARY	**1300–1600 HRS**
Welcome Happy Hour*	**1730–1900 HRS**
WEDNESDAY, 8 JANUARY	**0845–1600 HRS**
Luncheon*	**1230–1400 HRS**
THURSDAY, 9 JANUARY	**0845–1400 HRS**

**Proof of purchase is required and included in the registration fee where indicated.*

AIAA FOUNDATION
Advancing Aerospace

Please join our generous donors in advancing aerospace with your gift today. With your help, we will continue to inspire and support the next generation of aerospace professionals. Donations will be accepted in the HUB or online at **aiaa.org/foundation**.

AIAA Publications Pavilion within the HUB

Stop by the AIAA Publications Pavilion, located in the Exposition Hall, to browse publications and merchandise, learn about your membership benefits, and meet AIAA staff.

30% OFF ALL BOOKS

AIAA Publications is offering a special show discount on all titles featured at the AIAA SciTech Forum. Attendees can take advantage of a 30% discount off the list price of all books for sale at the AIAA Bookstore located in the AIAA Pavilion. This show special will only be available during the forum! Take advantage of these super savings and visit the AIAA Bookstore!

Meet the Author

KEVIN MICHAELS
AeroDynamic: Inside the High-Stakes Global Jetliner Ecosystem

Tuesday, 7 January 1500–1600 hrs

DANIEL P. RAYMER
Aircraft Design: A Conceptual Approach, Sixth Edition and *RDSwin Student software*

Wednesday, 8 January 1230–1430 hrs

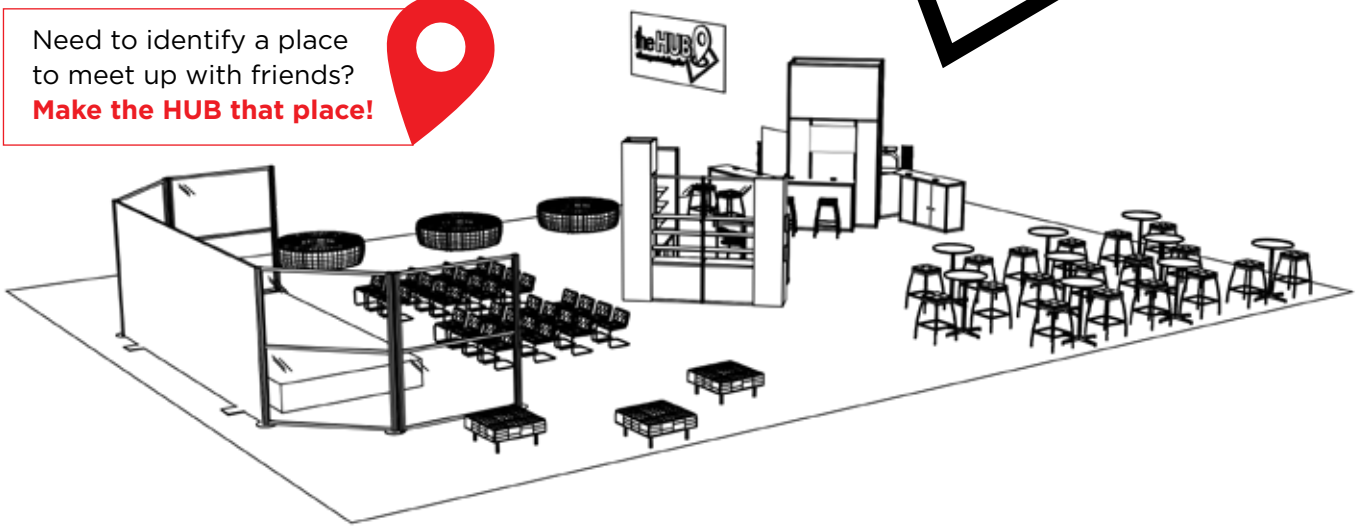




the HUB

where great minds gather

Need to identify a place to meet up with friends?
Make the HUB that place!



The HUB is open Tuesday–Thursday during Exposition Hall hours!

This multi-use area built into the heart of AIAA expositions features attendee-favorites like Q&As with keynote speakers, innovating programming, charging stations, a lounge area, and more.

Check out the complete schedule of activities:
aiaa.org/scitechthehub

HUB SCHEDULE

Tuesday, 7 January

1330–1400 HRS	2020 AIAA AVIATION Forum: We Get You—Here, There and Now Everywhere!
1400–1500 HRS	Unmanned Aircraft for Scientific Exploration of Extreme Environments
1500–1600 HRS	AeroDynamic: Inside the High-Stakes Global Jetliner Ecosystem

Wednesday, 8 January

0930–1000 HRS	SmartSat: A Modern Software-defined Satellite Architecture
1000–1030 HRS	Interview with Mary Lynne Dittmar
1030–1130 HRS	2020 AIAA DEFENSE Forum Preview: Compete, Deter and Win: Innovation at the Speed of Relevance
1130–1230 HRS	ASCEND Town Hall
1300–1400 HRS	Materials Start-Up Panel
1400–1430 HRS	Aircraft Design/RDSwin Presentation
1430–1500 HRS	2020 AIAA Propulsion and Energy Forum: Trumpeting the Future of Propulsion and Energy in the Big Easy
1500–1600 HRS	AIAA Public Policy Tweetup

Thursday, 9 January

0915–1000 HRS	Extended Q&A with Lori Garver
1000–1030 HRS	Lilium: An Air Taxi to Revolutionize the Way We Travel
1030–1130 HRS	The Weiss School, BLUECUBE Aerospace High School Project Update
1130–1230 HRS	ICYMI - Forum 360: Idea Challenge
1230–1400 HRS	Paws for a Break: Therapy Puppies and Movie Screening

Schedule subject to change.

EXPOSITION HALL FLOOR PLAN

EXHIBITORS BY BOOTH NUMBER

521 Aeronomics, Inc.

411 AeroVironment

223 Air Force Research Laboratory

509 Andor Technology

133 ANSYS, Inc.

131 ARI Industries, Inc. ★

123 Arnold Engineering Development Complex (AEDC)

108 Aurora Flight Sciences, A Boeing Company ★

523 BETA CAE Systems USA, Inc.

107 Boeing Technology Services ★

311 Calspan Corporation ★

228 Cambridge University Press

125 Convergent Science

513 Dantec Dynamics, Inc.

332 DEWESoft LLC

517 dSPACE ★

330 Ennova Technologies

511 ESTECO

225 Force Measurement Systems Inc. ★

410 GE Aviation ★

412 GE Research

322 General Atomics Aeronautical Systems, Inc. ★

132 HPCMP CREATE

229 HyperSizer - Collier Research ★

508 IC2 (Interdisciplinary Consulting Corp)

117 Intelligent Light ★

310 Kulite Semiconductor Products, Inc.

201 L3Harris

308 LaVision, Inc.

303 Lockheed Martin Corporation ★

408 M4 Engineering, Inc. ★

129 MathWorks ★

328 Metacomp Technologies ★

403 NASA

309 National Academies of Sciences, Engineering and Medicine

505 National Institute of Aerospace (NIA) ★

211 National Research Council Canada

203 Northrop Grumman Corporation ★

529 nTopology

217 Office of Naval Research

202 Ohio University

433 Overleaf

333 PACE Aerospace Engineering and Information Technology GmbH

519 PCB Piezotronics, Inc.

224 Phoenix Integration, Inc.

312 Pointwise, Inc. ★

316 Raytheon Company ★

130 Sandia National Laboratories

222 SDI Engineering Inc.

431 SmartUQ

119 Stress Engineering Services

213 Tecplot ★

209 Tri Models Incorporated

525 TSI Incorporated

230 Turbomachinery Laboratory

218 United Electronic Industries Inc

532 United States Air Force Civilian Service

324 University of Kansas - Aerospace Short Course Program

134 University of Tennessee - Mechanical, Aerospace & Biomedical Engineering

233 VirtusAero, LLC

531 Vision Research

★ *AIAA Corporate Member Company*

EXHIBITORS

Aeronomics, Inc. 521

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Aeronomics is small business providing advanced solutions to system engineering design problems. Founded in 2017, our team of industry recognized experts excels in the areas of thermal protection systems, hypersonic aerothermodynamics, thermostructural analysis, electronics thermal management, flight test and evaluation, and aerothermal ground test and evaluation, strategic simulation planning, threat modeling, hypersonic missile systems, and integrated defense architecture characterization.

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AeroVironment (NASDAQ: AVAV) is a technology solutions provider at the intersection of future-defining capabilities that include robotics, sensors, software analytics and connectivity. The company pioneered and is a leader in the markets for small Unmanned Aircraft Systems (UAS), Tactical Missile Systems (TMS), High-Altitude Pseudo-Satellites (HAPS) and Commercial Information Solutions (CIS).

Air Force Research Laboratory 223

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Air Force Research Laboratory (AFRL) is the only Air Force organization wholly dedicated to leading the discovery, development, and integration of warfighting technologies for the nation's air, space, and cyberspace forces.

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Arnold Engineering Development Complex (AEDC) 123

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EXHIBITORS

Aurora Flight Sciences, A Boeing Company 108

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www.aurora.aero

Aurora Flight Sciences, A Boeing Company is an innovative technology company which strives to create smarter aircraft through the development of versatile and intuitive autonomous systems. Operating at the intersection of technology and robotic aviation, Aurora leverages the power of autonomy to make manned and unmanned flight safer and more efficient. Headquartered in Manassas, Virginia, Aurora has more than 550 employees and operates in six locations.

BETA CAE Systems USA, Inc. 523

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AIAA members can post and browse resumes, browse job listings, and access other online employment resources by visiting the AIAA Career Center at **careercenter.aiaa.org**. In addition, there will be a job board located within the Exposition Hall.

Membership

AIAA is your vital lifelong link to the collective creativity and brainpower of the aerospace profession and a champion for its achievements. Students who are not yet members may apply their registration fee toward their first year's student member dues. **aiaa.org/member.**

Badge Policy

AIAA forum badges are provided to those individuals who have paid for a registration to the event. Badges must be worn at all times to participate in all forum activities. Badges are not provided at the registration desk for committee meetings attendance. In order to obtain an AIAA SciTech Forum badge, one must register for the forum.

Nondiscriminatory Practices

AIAA accepts registrations irrespective of age, race, creed, sex, sexual orientation, color, physical handicap, and national or ethnic origin.

Restrictions

Photos, video, or audio recording of sessions or exhibits, as well as the unauthorized sale of AIAA-copyrighted material, is prohibited.

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AUTHOR AND SESSION CHAIR INFORMATION

Speakers' Briefing in Session Rooms

Authors who are presenting papers will meet with session chairs and co-chairs in their session rooms for a short 30-minute briefing on the day of their sessions to exchange bios and review final details prior to the session. Please attend on the day of your session(s). Laptops preloaded with the Speakers' Briefing preparation slides will be provided in each session room. Speakers' Briefings will be held, **6–10 January at 0730 hrs.**

Speaker Ready Room

Speakers who wish to practice their presentations may do so in room Silver Spring II. A sign-up sheet will be posted on the door. In consideration of others, please limit practice time to 30-minute increments.

Audiovisual

Each session room will be preset with the following: Laptop computer, LCD projector, screen, microphone and sound system (if necessitated by room size), and a laser pointer. You may use your own laptop if you wish. Any additional audiovisual equipment requested onsite will be at cost to the presenter. Please note that AIAA does not provide security in the session rooms and recommends that items of value not be left unattended.

"No Paper, No Podium" and "No Podium, No Paper" Policies

If a written paper is not submitted by the final manuscript deadline, authors will not be permitted to present the paper at the forum. It is also the responsibility of those authors whose papers or presentations are accepted to ensure that a representative attends the forum to present the paper. If a paper is not presented at the forum, it will be withdrawn from the forum proceedings. These policies are intended to eliminate no-shows, to improve the quality of the forum for all participants, and to ensure that the published proceedings accurately represent the presentations made at a forum.

Journal Publication

Authors of appropriate papers are encouraged to submit them for possible publication in one of the Institute's archival journals: *AIAA Journal; Journal of Aerospace Information Systems; Journal of Air Transportation; Journal of Aircraft; Journal of Guidance, Control, and Dynamics; Journal of Propulsion and Power; Journal of Spacecraft and Rockets; or Journal of Thermophysics and Heat Transfer.* You may now submit your paper online at **http://mc.manuscriptcentral.com/aiaa**.

COMMITTEE MEETINGS

TIME	COMMITTEE AND ANCILLARY MEETINGS/EVENTS	ROOM
	Sunday, 5 January	
0800-1200	**Committee Leadership Training for the Technical Activities Division and the Integration and Outreach Division**	Celebration 5
0800-1200	**AIAA Council of Directors and Deputy Directors Training**	Celebration 6
0800-1800	**PCTC Model Validation Technical Meeting**	Celebration 8
1200-1800	**AIAA Council of Directors Workshop**	Orlando Ballroom L
1400-1500	**APATC Liaison Subcommittee**	Boardroom
1400-1500	**GTTC Steering**	Plaza Ballroom F
1500-1530	**GTTC Membership**	Plaza Ballroom F
1500-1600	**APATC Membership Subcommittee**	Columbia 34
1500-1600	**APATC Planning Subcommittee**	Columbia 35
1500-1600	**APATC Honors and Awards Subcommittee**	Columbia 36
1500-1600	**APATC Education Subcommittee**	Columbia 37
1500-1600	**APATC Publicity and Publications Subcommittee**	Challenger 40
1530-1630	**GTTC Program**	Plaza Ballroom F
1600-1700	**APATC Technical Activities**	Boardroom
1700-1730	**GTTC Conferences**	Plaza Ballroom F
1700-1800	**APATC Steering Committee**	Columbia 34
1700-1900	**Structures Technical Committee Lecture Meeting**	Bayhill 21
1730-1800	**GTTC Education & Student Activities**	Plaza Ballroom F
1800-1830	**GTTC Publications**	Plaza Ballroom F
1800-2100	**AIAA Information Systems Group Meeting**	Columbia 35
1800-2200	**Applied Aerodynamics Technical Committee**	Plaza Ballroom D
1830-1900	**GTTC Standards**	Plaza Ballroom F
1900-2030	**FDTC: Transition Discussion Group**	Barrel Spring II
1900-2100	**Space and Missiles Group**	Discovery 43
1900-2100	**AIAA Committee on Higher Education (formerly Academic Affairs)**	Celebration 7
1900-2200	**Aviation Technology, Integration and Operations Group Meeting**	Bayhill 22
1900-2200	**Propulsion and Energy Group Meeting**	Celebration 5
1900-2200	**Aerospace Design and Structures Group Leadership Meeting**	Columbia 34
	Monday, 6 January	
0800-1000	**RAC I**	Discovery 43
0800-1000	**GTTC Internal Strain Gauge Balance Working Group**	Challenger 40
0900-1000	**ABP Steering Committee**	Discovery 45
0900-1030	**Publications Ethical Standards Subcommittee**	Columbia 34
0900-1700	**Technical Activities Division**	Challenger 38 & 39
0930-1230	**GNC Paper Competition and Social**	Plaza Ballroom G
0930-1530	**NIA Technical Advisory Council Meeting**	Discovery 46
1000-1100	**HSABP Education Subcommittee**	Discovery 47
1000-1200	**GTTC Additive Manufacturing Working Group Development**	Challenger 40
1030-1200	**Books Series Subcommittee**	Discovery 45
1030-1230	**Journals Subcommittee**	Winter Park 50
1030-1730	**Regional Engagement Activities Division**	Boardroom
1100-1200	**HSABP Steering Committee**	Discovery 44
1100-1200	**GTE Technical Committee Steering Committee**	Discovery 48
1200-1500	**AIAA Astrodynamics joint with AAS Space Flight Mechanics Technical Committee Luncheon**	Regency Ballroom O & P

COMMITTEE MEETINGS

TIME	COMMITTEE AND ANCILLARY MEETINGS/EVENTS	ROOM
1200-1700	**Integration & Outreach Division**	Columbia 34
1245-1400	**ICME Lunch and Learn**	Celebration 7
1300-1400	**Inlets, Nozzles, and Propulsion Systems Integration Technical Committee**	Challenger 41 & 42
1300-1400	**Gas Turbine Engines Technical Committee**	Discovery 45
1300-1400	**High-Speed Air Breathing Propulsion Technical Committee**	Discovery 47
1300-1400	**GTTC Writing Qualities Working Group**	Challenger 40
1300-1700	**Aerospace Cybersecurity Working Group**	Orchid Room
1400-1500	**ABP Student Design Competition Working Group**	Winter Park 51
1400-1600	**GTTC Model Deformation Working Group**	Discovery 43
1400-1600	**GTTC Forming an Integration Committee: Aerospace Workforce Development**	Winter Park 50
1500-1600	**ABP Honors and Awards Working Group**	Challenger 40
1600-1700	**INPSI Technical Committee Steering Committee**	Winter Park 51
1600-1730	**Progress Series Editorial Advisory Board**	Discovery 45
1700-1830	**Astrodynamics Technical Committee**	Discovery 47
1700-1830	**AAS Space Flight Mechanics Technical Committee**	Challenger 41 & 42
1700-1900	**Student Activities Committee**	Discovery 46
1700-1900	**Green Engineering Integration Committee**	Discovery 48
1730-1830	**FDTC: Turbulence Model Benchmarking Working Group**	Winter Park 54
1730-1830	**FDTC: Massively Separated Flows Discussion Group**	Columbia 35
1730-1830	**APATC Missile and Projectile Aeroprediction Discussion Group**	Winter Park 49
1730-1900	**APATC Low Boom Discussion Group**	Columbia 36
1730-1900	**Technical Committee Showcase**	Regency Ballroom Q
1800-1900	**ABP Working Group**	Winter Park 51
1800-1900	**HyTASP Steering Committee**	Challenger 40
1800-2000	**FDTC: Solver Technology for Turbulent Flows DG & High-Order CFD Methods DG**	Manatee Spring II
1800-2000	**Purdue University, School of Aeronautics and Astronautics Alumni and Friends Reception**	Celebration 6
1800-2100	**Transformational Flight Integration Committee**	Winter Park 50
1800-2200	**Propellants and Combustion Technical Committee**	Plaza Ballroom D
1800-2200	**UCF - Aerospace Engineering Reception**	Barrel Spring I
1800-2200	**Digital Engineering Integration Committee**	Challenger 38 & 39
1830-1930	**Aerospace Design and Structures Group All-hands Meeting**	Plaza Ballroom H
1830-1930	**FDTC Reduced Complexity Flow Modeling & Analysis Discussion Group**	Bayhill 19
1830-2000	**FDTC & APATC Flow Control Integration Discussion Group**	Columbia 37
1830-2000	**APATC Sailplane Aero & Design Discussion Group**	Bayhill 18
1830-2000	**APATC Aero-Propulsive Interactions Discussion Group**	Bayhill 23
1900-2030	**FDTC Non-Equilibrium Discussion Group**	Manatee Spring I
1900-2100	**PSU – Aerospace Engineering Alumni Reception**	Fiorenzo Lounge
1900-2100	**University of Washington Aero & Astro Reception at SciTech**	Peacock Spring
1900-2100	**FDTC High Speed Fluid-Structure Interaction Discussion Group**	Barrel Spring II
1900-2100	**Space Tethers Technical Committee**	Boardroom
1900-2100	**Supersonics Working Group**	Bayhill 17
1900-2100	**HyTASP Technical Committee**	Challenger 41 & 42
1900-2100	**Air Breathing Propulsion Business Meeting**	Bayhill 21
1900-2100	**MVCE Mesh Suitability Working Group**	Discovery 44
1900-2100	**MVCE Computational Environments Subcommittee**	Columbia 34
1900-2200	**Friends of UC Reception**	Orchid Room

COMMITTEE MEETINGS

TIME	COMMITTEE AND ANCILLARY MEETINGS/EVENTS	ROOM
1900-2200	**Microgravity and Space Processes Technical Committee**	Discovery 45
1900-2200	**Software Technical Committee**	Discovery 43
1900-2200	**CFD Vision 2030 Integration Committee**	Bayhill 22
1930-2130	**FDTC Theoretical Fluid Mechanics Discussion Group**	Winter Park 54
2000-2100	**FDTC Uncertainty Quantification Discussion Group**	Bayhill 20
2000-2100	**FDTC: Large Eddy Simulation (LES) Discussion Group**	Manatee Spring II
	Tuesday, 7 January	
0800-1200	**GTTC Model Attitude Measurement Working Group**	Columbia 37
0900-1000	**Education Series Advisory Board**	Columbia 34
0900-1100	**GTTC Working Group Development Part1: Utilizing CFD to Improve Ground Testing**	Discovery 43
0930-1130	**Certification/Qualification by Analysis CoI Steering Committee**	Discovery 44
0930-1200	**Young Professional Group**	Discovery 46
1100-1200	**Publications Review Subcommittee**	Columbia 36
1100-1200	**AIAA Council of Directors Discussion Session**	Celebration 7
1200-1400	**GNC Undergraduate Competition Experience Lunch**	Discovery 47
1200-1430	**Aerospace Sciences Group**	Columbia 38 & 39
1230-1400	**FDTC Future of Fluids Discussion Group**	Discovery 43
1245-1415	**Follow up Session for Stratospheric Aerosol Injection Aircraft Concept Presentation**	Celebration 7
1300-1500	**AIAA Standards Steering Committee (SSC)**	Columbia 36
1300-1700	**Public Policy Committee Meeting**	Columbia 35
1400-1500	**CASE/Defense Community of Interest Discussion**	Discovery 44
1400-1530	**RAC II Meeting**	Columbia 37
1400-1600	**2021 Associate Fellows Committee Kickoff Meeting**	Winter Park 50
1400-1600	**Space Operations and Support Technical Committee**	Challenger 40
1400-1600	**GTTC Working Group Development: Wind Tunnel Model Design / Recommended Practices Guide Development**	Discovery 45
1400-1600	**GTTC Flow Quality Working Group**	Discovery 46
1530-1730	**Emerging Technologies Committee**	Boardroom
1600-1630	**Thermophysics Technical Committee Publications Subcommittee**	Discovery 43
1600-1630	**Thermophysics Technical Committee Best Paper Subcommittee**	Columbia 36
1630-1700	**Thermophysics Technical Committee Awards Subcommittee**	Columbia 37
1630-1730	**Continuing Education Committee Meeting**	Columbia 34
1700-1730	**Thermophysics Technical Committee Nominations Subcommittee**	Challenger 40
1700-1800	**Propulsion Aerodynamics Workshop (PAW) Working Group**	Celebration 7
1700-1830	**Technical Administration Subcommittee (AIAA/AAS Space Flight Mechanics Meeting)**	Challenger 41 & 42
1700-1830	**AIAA/AAS Space Flight Mechanics Meeting Conference Administration Subcommittee**	Columbia 38 & 39
1700-1830	**AIAA/AAS Space Flight Mechanics Meeting Website Administration Subcommittee**	Discovery 45
1700-1900	**AIAA Computational Fluid Dynamics (CFD) CoS**	Discovery 47
1730-1800	**Thermophysics Technical Committee Education Subcommittee**	Columbia 36
1730-1900	**MVCE Geometry & Meshing Workshop 3**	Discovery 43
1800-1830	**Thermophysics Technical Committee Publicity Subcommittee**	Columbia 37
1800-1900	**APATC Stability and Control Prediction Discussion Group**	Celebration 7
1800-1930	**Aircraft Electrified Propulsion and Power Working Group**	Regency Ballroom P
1800-2000	**APATC Rotorcraft Discussion Group**	Windermere WZ
1800-2100	**Design Engineering Technical Committee**	Columbia 35
1800-2100	**Intelligent Systems Technical Committee**	Regency Ballroom O

COMMITTEE MEETINGS

TIME	COMMITTEE AND ANCILLARY MEETINGS/EVENTS	ROOM
1800-2100	**Small Satellite Technical Committee**	Discovery 46
1800-2100	**Survivability Technical Committee**	Orchid Room
1800-2300	**Guidance Navigation, and Control Technical Committee**	Regency Ballroom Q
1830-1900	**Thermophysics Technical Committee Emerging Technologies Subcommittee**	Challenger 40
1830-2030	**Aeroelastic Prediction Workshop (APeW3)**	Bayhill 24
1830-2130	**Terrestrial Energy Technical Committee**	Barrel Spring I
1830-2130	**Wind Energy Technical Committee**	Winter Park 50
1830-2130	**Computer Systems Technical Committee**	Boardroom
1830-2200	**Systems Engineering Technical Committee**	Bayhill 19
1830-2230	**Atmospheric Flight Mechanics Technical Committee**	Barrel Spring II
1900-1930	**Thermophysics Technical Committee Conferences Subcommittee**	Columbia 36
1900-2100	**AMT TC Networking and Member Presentations**	Plaza Ballroom I
1900-2100	**FDTC Flow Control and Fluid Applications Subcommittee**	Winter Park 54
1900-2100	**MVCE Meshing Subcommittee**	Discovery 48
1900-2100	**RLV Technical Committee Planning Meeting**	Winter Park 49
1900-2100	**FDTC CFD Methods Subcommittee**	Bayhill 17
1900-2100	**Aerospace Department Chairs Association (ADCA)**	Plaza Ballroom D
1900-2100	**FDTC Fundamentals of Flow Phenomena SC**	Bayhill 23
1900-2200	**Aeroacoustics Technical Committee**	Bayhill 18
1900-2200	**Adaptive Structures Technical Committee**	Bayhill 20
1900-2200	**Sensor Systems and Information Fusion Technical Committee**	Bayhill 21
1900-2200	**Plasmadynamics and Lasers Technical Committee**	Bayhill 22
1900-2200	**Structures Technical Committee**	Manatee Spring II
1930-2230	**Thermophysics Technical Committee**	Plaza Ballroom F
1930-2230	**Materials Technical Committee**	Manatee Spring I
1930-2230	**Space Exploration Integration Committee**	Columbia 37
2000-2130	**APATC Collaborative Experiments & Computations Discussion Group**	Columbia 38 & 39
	Wednesday, 8 January	
0800-1200	**GTTC High Speed Wind Tunnel Calibration Working Group**	Columbia 36
0830-1200	**Publications Committee**	Challenger 41 & 42
0900-1100	**Council Innovation and Initiative Committee (CIIC)**	Columbia 34
0900-1200	**GTTC Future of Ground Test Working Group**	Challenger 40
0900-1200	**GTTC Dual Flow Reference Nozzle Working Group**	Discovery 43
1000-1200	**Finance Committee**	Boardroom
1100-1200	**SciTech 2021 Technical Program Planning**	Regency Ballroom O
1130-1630	**Honors and Awards Committee**	Celebration 7
1230-1400	**FDTC Steering Committee**	Columbia 34
1300-1500	**V/STOL Technical Committee Meeting**	Boardroom
1300-1600	**GTTC Uncertainty Standard Working Group**	Columbia 36
1300-1600	**Content Advisory Committee**	Challenger 40
1300-1700	**AIAA Council of Directors**	Regency Ballroom O
1500-1600	**International Activities Group**	Discovery 43
1600-1800	**Flight Test Technical Committee**	Discovery 45
1630-1700	**GTTC Awards**	Celebration 7
1630-1800	**Lockheed Martin Aeronautics Company Meeting**	Regency Ballroom P
1700-1900	**University of Illinois Dept. of Aerospace Alumni Reception**	Urban Tide Restaurant

COMMITTEE MEETINGS

TIME	COMMITTEE AND ANCILLARY MEETINGS/EVENTS	ROOM
1700-2000	**Energy Optimized Aircraft Systems Integration Committee**	Challenger 41 & 42
1730-1830	**FDTC: Computational Methods for High-Speed Multiphase Flows**	Discovery 43
1730-1900	**APATC CFD Transition Modeling Discussion Group**	Challenger 38 & 39
1800-2000	**Information and Command & Control Technical Committee**	Columbia 36
1830-2000	**APATC High Lift Common Research Model Applications Discussion Group**	Plaza Ballroom E
1830-2000	**NCSU MAE Alumni Reception**	Barrel Spring I
1830-2030	**Virginia Tech Alumni and Friends**	Rock Spring I & II
1830-2030	**Aero Alumni Reunion Reception**	Celebration 11
1830-2100	**Modeling and Simulation Technical Committee**	Bayhill 22
1830-2100	**Multidisciplinary Design Optimization Technical Committee**	Plaza Ballroom F
1830-2100	**History Integration Committee**	Bayhill 17
1830-2130	**Pressure Gain Combustion Technical Committee**	Regency Ballroom O
1830-2130	**Pre-Post Party: Pointwise, Tecplot & FieldView**	Celebration 10
1830-2145	**Society and Aerospace Technology Integration Committee**	Challenger 40
1900-2100	**Unmanned Systems Integration Committee**	Bayhill 19
1900-2100	**Solid Rockets Technical Committee**	Bayhill 20
1900-2100	**University of Maryland Alumni Reception**	Coral Spring I
1900-2200	**Aerodynamic Measurement Technology Technical Committee**	Plaza Ballroom D
1900-2200	**Spacecraft Structures Technical Committee**	Regency Ballroom P
1900-2200	**Fluid Dynamics Technical Committee**	Plaza Ballroom I
1900-2200	**Structural Dynamics Technical Committee**	Plaza Ballroom K
1900-2200	**Meshing, Visualization, and Computational Environments Technical Committee**	Bayhill 21
1900-2200	**Non-Deterministic Approaches Technical Committee**	Manatee Spring I
1900-2200	**Aircraft Design Technical Committee**	Manatee Spring II
1900-2200	**AD&S Student Paper Competition Deliberations**	Boardroom
1930-2200	**ICME Working Group Meeting**	Bayhill 18
	Thursday, 9 January	
0900-1200	**Certification/Qualification by Analysis CoI: CRM-HL Ecosystem**	Challenger 41 & 42
0900-1200	**GTTC Statistically Defensible Test Methods Focus Group**	Boardroom
0930-1530	**AIAA Board of Trustees**	Challenger 38 & 39
1300-1700	**Industry/Regulatory Composite Working Group Planning**	Columbia 34
1400-1600	**GTTC Focus Group Development: Dynamics in Internal Strain Gauge Balances**	Columbia 35
1500-1800	**History of Aircraft Design Working Group**	Challenger 41 & 42
1600-1730	**SciTech Executive Steering Committee (2020/2021) DeBriefing**	Boardroom
1730-1900	**High Speed Code Credibility**	Bayhill 22
1730-2130	**Ground Test Committee**	Regency Ballroom O & P
1830-2030	**TU Delft Alumni Event**	Peacock Spring
1830-2100	**Atmospheric and Space Environments Technical Committee**	Challenger 38 & 39
1900-2100	**CREATE-AV User's Group Meeting**	Celebration 1
1900-2100	**MVCE Geometry Modeling Working Group**	Columbia 34
	Friday, 10 January	
0900-1700	**AWAKEN Instrumentation Development Meeting**	Challenger 41 & 42

Sunday

Sunday, 5 January 2020

1-NW-1 1500 - 1630 hrs	Ignite the "Meet"ing	Regency Ballroom O&P

Nothing can be more intimidating than being a newcomer or young person at a conference or event where everyone already knows one another! Learn tips and techniques on networking and relationship building that will make your forum experience more enjoyable and productive. The session will focus on creating an introduction, understanding how to engage with others, playing off the unique networking styles of introverts and extroverts, and some "dos and don'ts" of networking. Then participants will take part in an activity designed to foster quick friendships so they never enter a forum session or reception feeling like a stranger.

Sunday, 5 January 2020

2-NW-2 1645 - 1830 hrs	Meet the Employers	Orlando Ballroom M&N

This event offers students and young professionals the opportunity to meet AIAA corporate members and government agencies. This is a fun and dynamic environment where students and professionals interact with organizations regarding employment opportunities. Participating companies/organizations will present a brief organizational overview and opportunities available, then have follow-on discussions with the attendees. Organizations will host a table and attendees will switch every 10 minutes.

Sunday, 5 January 2020

3-NW-3 1830 - 1930 hrs	Student Welcome Mixer	Regency Ballroom O&P

Mingle with your peers and hear from AIAA leadership. This reception provides you with the opportunity to meet your fellow students and learn more about the opportunities available to you as an AIAA student member. Games, entertainment, and light fare will be provided! A cash bar will be available to students age 21 and over with a valid ID. (Proof of student registration required.)

Sunday, 5 January 2020

4-NW-4 1930 - 2000 hrs	SciTech 101	Regency Ballroom Q

Discover how you can make the most of your week at AIAA SciTech Forum while meeting fellow attendees. This orientation is ideal for first-time attendees, but all are welcome!

Monday

Monday, 6 January 2020

5-SB-1 0730 - 0800 hrs	Monday Speaker Briefing	Session Rooms

Monday, 6 January 2020

6-PLNRY-1 0800 - 0900 hrs	Using Space to Support a Sustainable Society	Windermere Ballroom

Moderator: Amy Pritchett, Professor and Head, Department of Aerospace Engineering, Pennsylvania State University

Danielle Wood
Director, Space Enabled Research Group, MIT Media Lab
Assistant Professor, Media Arts & Sciences and Aeronautics and Astronautics, Massachusetts Institute of Technology

Monday, 6 January 2020

7-NW-5 0900 - 0930 hrs	Monday Morning Networking Coffee Break	Celebration and Regency Foyers

Monday, 6 January 2020

8-AA-1	Jet Noise I	Peacock Spring

Chaired by: K. AHUJA, Georgia Institute of Technology and C. TINNEY, Applied Research Laboratories

0930 hrs
AIAA-2020-0001
Effectiveness of Fluid Injection on Supersonic Jet Noise at High Exhaust Temperatures
C. Prasad, P. Morris, Pennsylvania State University, University Park, PA

1000 hrs
AIAA-2020-0002
Acoustic Experiment and Numerical Simulation on Unheated Supersonic Jet Flow for a Small-scale Nozzle
S. Kang, H. Joo, S. Shin, Seoul National University, Seoul, South Korea; T. Park, W. Ohm, Yonsei University, Seoul, South Korea; J. Park, Agency for Defense Development, Daejeon, South Korea

1030 hrs
AIAA-2020-0003
Experiments on Thrust, Flowfield and Noise of a Rectangular Mixer-Ejector Nozzle
K. Zaman, R. Castner, J. Bridges, A. Fagan, P. Upadhyay, NASA Glenn Research Center, Cleveland, OH

1100 hrs
AIAA-2020-0004
Near-field Jet/Surface Interactions of a Heated Supersonic Jet
F. Baier, A. Karnam, E. Gutmark, University of Cincinnati, Cincinnati, OH

1130 hrs
AIAA-2020-0005
Characterization of High Speed Jet Acoustics Using High-resolution Multi-reference Continuous-scan Acoustic Measurements on a Linear Array
P. Shah, ATA Engineering, Inc., San Diego, CA; D. Papamoschou, University of California, Irvine, Irvine, CA

1200 hrs
AIAA-2020-0006
A review of aeroacoustics of supersonic jets interacting with solid surfaces
S. Salehian, R. Mankbadi, Embry-Riddle Aeronautical University, Daytona Beach, FL

Monday, 6 January 2020

9-ACD-1	Aircraft Configuration Design Studies - Flying/Blended and Truss-Braced Wings					Orlando Ballroom L
Chaired by: S. KOMADINA, Raytheon Missile Systems and R. PEREZ, Royal Mil College of Canada						
0930 hrs AIAA-2020-0007 **Vehicle Design Study of a Straight Flying-Wing with Bell Shaped Spanload** K. Hainline, J. Richter, R. Agarwal, Washington University in St. Louis, St. Louis, MO	1000 hrs AIAA-2020-0008 **Conceptual Design and Optimization of a Solar-Electric Blended Wing Body Aircraft for General Aviation** N. Kleemann, S. Karpuk, A. Elham, Technical University of Braunschweig, Braunschweig, Germany	1030 hrs AIAA-2020-0009 **Multi-fidelity Design Optimization of a Long Range Blended Wing Body Aircraft with New Airframe Technologies** Y. Liu, A. Swamy, A. Elham, Technical University of Braunschweig, Braunschweig, Germany	1100 hrs AIAA-2020-0010 **Trade-off Analysis of Incorporating Very High Aspect Ratio Truss-Braced Wings and Very High Bypass Ratio Turbofan Engines on a Regional Turboprop Aircraft** S. Hosseini, M. Vaziri-Zanjani, Amirkabir University of Technology, Tehran, Iran	1130 hrs AIAA-2020-0011 **Development of an Efficient M=0.80 Transonic Truss-Braced Wing Aircraft** N. Harrison, The Boeing Company, Huntington Beach, CA; G. Gatlin, S. Viken, NASA Langley Research Center, Hampton, VA; M. Beyar, E. Dickey, K. Hoffman, The Boeing Company, Huntington Beach, CA; et al.		

Monday, 6 January 2020

10-ACD-2	Aircraft System/Subsystem Design and Architecture					Bayhill 19
Chaired by: M. DRAKE, Boeing Commercial Airplanes and S. SWAINE, Gulfstream Aerospace Corporation						
0930 hrs AIAA-2020-0012 **Conceptual Design of Aircraft System Routing Architectures Using a Bio-Inspired Algorithm** J. Taneichi, K. Rinoie, University of Tokyo, Tokyo, Japan	1000 hrs AIAA-2020-0013 **A Multi-Design Point Sizing Methodology for Environmental Control Systems** M. Shi, Y. Cai, J. Gladin, D. Mavris, Georgia Institute of Technology, Atlanta, GA	1030 hrs AIAA-2020-0014 **Electrical Cable Design for Urban Air Mobility** E. Aretskin-Hariton, M. Lizcano, J. Hurst, E. Hendricks, J. Chapman, NASA Glenn Research Center, Cleveland, OH; A. Goretski, Mississippi State University, Mississippi State, MS	1100 hrs AIAA-2020-0015 **Propulsion System Component Modeling for an All-Electric Commuter Aircraft Mission** S. Byahut, A. Uranga, University of Southern California, Los Angeles, CA			

Monday, 6 January 2020

11-ACD-3/APA-1/TF-1	Propeller and Ducted Fan Design					Florida Ballroom C
Chaired by: A. CHAPUT, University of Texas at Austin and W. ANEMAAT, DARcorporation						
0930 hrs AIAA-2020-0016 **Propeller Design Education, Sizing and Analysis - Back to Basics Approach II** A. Chaput, University of Texas, Austin, Austin, TX	1000 hrs AIAA-2020-0017 **Electric Ducted Fan Design and Testing for High Performance UAV Integration** D. Darrah, J. Eppler, W. Liu, W. Anemaat, Design, Analysis and Research Corporation, Lawrence, KS	1030 hrs AIAA-2020-0018 **Aerodynamic Modeling and Design Procedures for Unmanned Aerial Vehicle Propeller** M. Zakaria, O. Abdelhameed, M. Abdelghafaar, M. Yassin, Military Technical College, Cairo, Egypt	1100 hrs AIAA-2020-0019 **Uncertainty Management in Technologies Prioritization for Future Aircraft Program** C. Jouannet, K. Amadori, E. Bäckström, Saab Group, Linköping, Sweden; D. Bianchi, Embraer, São Jose dos Ca, Brazil			

Monday, 6 January 2020

12-AFM-1	Trajectory Optimization and Control					Bayhill 17
Chaired by: F. FRESCONI, US Army Research Lab and B. JOLLY, USAF and T. LAVIN, Sandia National Laboratories						
0930 hrs AIAA-2020-0020 **Control Surface Design Analysis and Actuation Requirements Development for Munitions** J. Bryson, J. Vasile, B. Gruenwald, F. Fresconi, Army Research Laboratory, Aberdeen Proving Ground, MD	1000 hrs AIAA-2020-0021 **Trajectory Shaping for Quasi-Equilibrium Glide in Guided Munitions** L. Fairfax, J. Vasile, L. Strohm, F. Fresconi, Army Research Laboratory, Aberdeen Proving Ground, MD	1030 hrs AIAA-2020-0022 **Unified Trigonometrization Method for Solving Optimal Control Problems in Atmospheric Flight Mechanics** K. Mall, Purdue University, West Lafayette, IN; E. Taheri, Auburn University, Auburn, AL	1100 hrs AIAA-2020-0023 **A Deep Learning-Based Approach to Real-Time Trajectory Optimization for Hypersonic Vehicles** Y. Shi, Z. Wang, University of Tennessee, Knoxville, Knoxville, TN	1130 hrs AIAA-2020-0024 **Optimal Acceleration Procedure from Launch to Maximum Speed in High-Speed Dynamic Soaring** G. Sachs, Technical University of Munich, Munich, Germany	1200 hrs AIAA-2020-0025 **Optimal Climb Performance of Electric Aircraft for Minimal Charge Consumption** G. Barufaldi, M. Morales, R. Silva, Technological Institute of Aeronautics (ITA), São José dos Campos, Brazil	

Monday, 6 January 2020

13-AFM-2 | **0930 - 1230 hrs** | **UAS Handling Qualities Workshop** | **Florida Ballroom A**

The theme of the annual UAS Handling Qualities Workshop is *Delivering on the Promise – Defining UAS Handling Qualities for Large and Small Aircraft Missions.*

Description of a UAS MTE Development Process
David Klyde
Systems Technology, Inc.

Navy Priorities in the Development of a UAS HQ Spec
Ryan Paul
Naval Air Systems Command

Development and Flight Validation of Unmanned Aerial System Handling Qualities Requirements for Multicopters
Christine Ivler
University of Portland

Update on UAS Handling Qualities using FPV Cueing
William Geyer
U.S. Naval Test Pilot School

A Systematic and Repeatable Approach for Characterizing UAS Response to Weather
Andy Thurling
NUAIR

Evaluation of sUAS Multirotor MTEs in the NASA LaRC 14' x 22' Wind Tunnel
Amanda Lampton
Systems Technology, Inc.

Use of the Calspan Learjet In-Flight Simulator as a UAS Surrogate
Paul Schifferle
Calspan Corporation

UAS Flight Testing at Texas A&M Including Novel System Identification Methods
John Valasek
Texas A&M University

Flight Test Capabilities at Penn State in Support of UAS Handling Qualities Evaluations
Eric Johnson
Pennsylvania State University

Monday, 6 January 2020

14-AMT-1 | **Data Processing, Data Analysis, Data Driven Modeling, and Model Validation Techniques** | **Bayhill 23**

Chaired by: L. RIBAROV, Hamilton Sundstrand and X. LIU, San Diego State University

0930 hrs
AIAA-2020-0026
Assessment of Temperature-Dependent Regression Model Terms of a RUAG Six-Component Block-Type Balance
N. Ulbrich, Jacobs, Moffett Field, CA; C. Zimmermann, RUAG Group, Emmen, Switzerland

1000 hrs
AIAA-2020-0027
Development of a Non-Iterative Balance Load Prediction Algorithm for the NASA Ames Unitary Plan Wind Tunnel
N. Ulbrich, Jacobs, Moffett Field, CA; M. Amaya, A. l'Esperance, NASA Ames Research Center, Moffett Field, CA

1030 hrs
AIAA-2020-0028
Tomographic Reconstruction from Schlieren Images of Slender Body with Asymmetric Protuberances
M. Akamine, S. Yamauchi, S. Nonaka, Japan Aerospace Exploration Agency (JAXA), Sagamihara, Japan; Y. Takagi, H. Takimoto, K. Kitamura, Yokohama National University, Yokohama, Japan

1100 hrs
AIAA-2020-0029
Comparison of a physical model and a machine learning approach for a more accurate assessment of fuel efficiency measures
F. Enkelmann, Technical University of Darmstadt, Hamburg, Germany; R. Heigl, K. Pfingsten, Lufthansa Technik, Hamburg, Germany

1130 hrs
AIAA-2020-0030
SDSU Water Tunnel Test Section Flow Quality Characterization
J. Moreto, X. Liu, San Diego State University, San Diego, CA

Monday, 6 January 2020

15-APA-2 | **Applications of Large-Eddy Simulations** | **Plaza Ballroom D**

Chaired by: K. KARA, Oklahoma State University and S. SAXENA, ANSYS

0930 hrs
AIAA-2020-0031
Analysis of riblets performance in pressure gradient flow by Large Eddy Simulation
B. Mele, R. Tognaccini, University of Naples "Federico II", Naples, Italy; P. Catalano, D. de Rosa, Italian Aerospace Research Center (CIRA), Capua, Italy

1000 hrs
AIAA-2020-0032
Time-Accurate LES of a Cone-Slice-Ramp at Mach 6
E. Vogel, R. Ali, J. Coder, University of Tennessee, Knoxville, Knoxville, TN

1030 hrs
AIAA-2020-0033
High-Order Large Eddy Simulations of High-Speed Boundary Layer Transition
Y. Delorme, N. Hoffmann, S. Frankel, Technion–Israel Institute of Technology, Haifa, Israel

1100 hrs
AIAA-2020-0034
Transonic Application of LBM and HRLES on a Gulfstream GV/GV-SP
J. Garcia, Gulfstream Aerospace Corporation, Savannah, GA

1130 hrs
AIAA-2020-0035
Computational Assessment of Actuator Line Model for Large Eddy Simulation of Rotor Noise
R. Stanly, Y. Delorme, S. Frankel, Technion--Israel Institute of Technology, Haifa, Israel

1200 hrs
AIAA-2020-0036
Aerodynamic force prediction of the laminar to turbulent flow transition around the front bumper of the vehicle using Dynamic-slip wall model LES
K. Ambo, H. Nagaoka, Honda Corporation, Tochigi, Japan; D. Philips, C. Ivey, G. Brès, S. Bose, Cascade Technologies, Inc., Palo Alto, CA

Monday, 6 January 2020

16-APA-3 | **Supersonic Aerodynamics** | **Coral Spring I**

Chaired by: M. PARK, NASA-Langley Research Center and M. TUFTS, AFRL/RQHF

0930 hrs
AIAA-2020-0037
Comparison of Two High-Order Large Eddy Simulation Solvers for Flow Over a Wall-Mounted Hemisphere
P. Morgan, D. Weston, Ohio Aerospace Institute, Dayton, OH; M. Visbal, Air Force Research Laboratory, Wright-Patterson AFB, OH

1000 hrs
AIAA-2020-0038
Control of Shock Wave Turbulent Boundary Layer Interaction using Structurally Constrained Active Surface Morphing
V. Shinde, D. Gaitonde, J. McNamara, Ohio State University, Columbus, OH

1030 hrs
AIAA-2020-0039
Scaling and Similitude in Single Nozzle Supersonic Retropropulsion Aerodynamics Interference
A. Korzun, NASA Langley Research Center, Hampton, VA; L. Cassel, LZ Technology, Inc., Houston, TX

1100 hrs
AIAA-2020-0040
Investigation of Tandem Injection in Supersonic Flow using Schlieren Visualization
S. de Maag, H. Hoeijmakers, C. Venner, F. Segerink, H. Offerhaus, University of Twente, Enschede, The Netherlands

1130 hrs
AIAA-2020-0041
Effect of Flow Three Dimensionality on Interaction Length in Shockwave Turbulent Boundary Layer Interaction
S. Baskaran, M. T M, Indian Institute of Technology Madras, Chennai, India

Monday, 6 January 2020

17-APA-4	Special Session: Aerodynamic Design Optimization Discussion Group I					Barrel Spring II
Chaired by: J. HICKEN, Rensselaer Polytechnic Institute and S. NADARAJAH, McGill University						
0930 hrs AIAA-2020-0042 **Objectives and Constraints for Transonic Wing Optimization** D. Poole, C. Allen, T. Rendall, University of Bristol, Bristol, United Kingdom	1000 hrs Oral Presentation **Proposed unsteady test case for the Aerodynamic Design Optimization Discussion Group** J. Hicken, T. Babcock, G. Bedonian, S. Kaur, G. Yan, Rensselaer Polytechnic Institute, Troy, NY	1030 hrs AIAA-2020-0043 **Perspectives on aerodynamic design optimization** J. Martins, University of Michigan, Ann Arbor, Ann Arbor, MI	1100 hrs Oral Presentation **Comparisons of the Aerodynamic Shape Optimization of the Common-Research Model** S. LeDoux, The Boeing Company, Everett, WA; S. Nadarajah, McGill University, Montréal, Canada			

Monday, 6 January 2020

18-APA-5	Flow Control Demonstrations and Applications I					Florida Ballroom B
Chaired by: T. IVANCO, NASA-Langley Research Center and K. BERGERON, DoD HPCMP, CREATE						
0930 hrs AIAA-2020-0044 **Investigation of Drag Reduction on a Circular Cylinder using Microfiber Coating by Changing its Permeability** M. Hasegawa, H. Sakaue, University of Notre Dame, Notre Dame, IN	1000 hrs AIAA-2020-0045 **Study of Mach Number Effect for 3D Co-Flow Jet Wings at Cruise Conditions** Y. Wang, G. Zha, University of Miami, Coral Gables, FL	1030 hrs AIAA-2020-0046 **Influence of tripping devices in hastening transition in a flat plate submitted to zero and favorable pressure gradients** F. dos Santos, M. Sanders, L. Dantas de Santana, C. H. Venner, University of Twente, Enschede, The Netherlands	1100 hrs AIAA-2020-0047 **Analysis of Micro-compressor Performance with Integrated Co-flow Jet Airfoil Ducting System** K. Xu, B. McBreen, Y. Ren, G. Zha, University of Miami, Coral Gables, FL			

Monday, 6 January 2020

19-ASE-1	Instruments and Techniques					Bayhill 32
Chaired by: E. BERING, University of Houston and N. GREEN, Jet Propulsion Laboratory						
0930 hrs AIAA-2020-0048 **Development and Characterization of an Ion Source to Simulate Solar Wind Plasma in a Vacuum Chamber** B. Folta, T. McGarvey, D. Han, Missouri University of Science and Technology, Rolla, MO	1000 hrs AIAA-2020-0049 **An X-ray Spectroscopic Approach to Remote Space Object Potential Determination: Experimental Results** K. Wilson, H. Schaub, University of Colorado, Boulder, Boulder, CO	1030 hrs AIAA-2020-0050 **Plate Lines Reduce Lifetime of Wake Vortices During Final Approach to Vienna Airport** F. Holzaepfel, A. Stephan, G. Rotshteyn, German Aerospace Center (DLR), Cologne, Germany				

Monday, 6 January 2020

20-CASE-1 0930 - 1130 hrs	Operationalizing Artificial Intelligence for Complex Aerospace Systems	Plaza Ballroom I

Artificial Intelligence (AI) has been identified as a high research priority across government, industry, and academia. It has shown promise in high impact applications such as autonomous drone delivery, self-driving cars, manufacturing, agricultural practices, and military decision-making. Operational AI aims to address decision-making in unstructured, uncertain, and complex environments. Such systems must operate robustly in real time. However, effective methods, tools, and standards for developing trustworthy AI-based systems still remain as open research questions. Panel members from diverse areas of expertise will provide opening statements and then field questions from both the panel moderator and the audience.

Panelists:

Brian Sadler
Army Senior Scientist for Intelligent Systems
Combat Capabilities Development Command (CCDC)
Army Research Laboratory (ARL)

Anne Kao
Senior Technical Fellow
The Boeing Company

Zohaib Mian
Chief Systems Engineer and
Technical Program Manager
Loon LLC

Owen Brown
Vice President of Research & Development
Scientific Systems Company, Inc.

Ali (Khalid) Raz
CASE Scholar and Visiting Assistant Professor of
Aeronautics and Astronautics
Purdue University

Monday, 6 January 2020						
21-CMS-1	Communications Systems					Celebration 8
Chaired by: D. RAIBLE, NASA Glenn Research Center						
0930 hrs AIAA-2020-0051 **Free Space Optical Link Utilizing a Modulated Retro-Reflector Intended for Planetary Duplex Communication Links between an Orbiter and Surface Unit** S. Booth, NASA Glenn Research Center, Cleveland, OH	1000 hrs AIAA-2020-0052 **Flocking of V-shaped and Echelon Northern Bald Ibises with Different Wingspans: Repositioning and Energy Saving** A. Mirzaeinia, New Mexico Institute of Mining and Technology, Socorro, NM; M. Mirzaeinia, Amirkabir University of Technology, Tehran, Iran; M. Hassanalian, New Mexico Institute of Mining and Technology, Socorro, NM	1030 hrs AIAA-2020-0053 **Adaptive Retransmission Time Out in Flying Ad-Hoc Network By LSTM Machine Learning: Round Trip Time Prediction** A. Mirzaeinia, New Mexico Institute of Mining and Technology, Socorro, NM; M. Mirzaeinia, Amirkabir University of Technology, Tehran, Iran; M. Shekaramiz, Utah Valley university, Orem, UT; M. Hassanalian, New Mexico Institute of Mining and Technology, Socorro, NM				

Monday, 6 January 2020						
22-DA-1	Digital Avionics and Air Traffic Management					Celebration 11
Chaired by: D. ABERNATHY, Lockheed Martin Aeronautics						
0930 hrs AIAA-2020-0054 **Information Management to Mitigate Loss of Control Inflight Airline Accidents** T. Etherington, L. Kramer, S. Young, T. Daniels, NASA Langley Research Center, Hampton, VA	1000 hrs AIAA-2020-0055 **Objective Flight Evaluation of Visual Cue for DVE Helicopter Operation** K. Funabiki, H. Tsuda, A. Shimizu, Y. Sugihara, Japan Aerospace Exploration Agency (JAXA), Mitaka, Japan; K. Tawada, K. Hasebe, Shimadzu Corporation, Kyoto, Japan	1030 hrs AIAA-2020-0056 **Pilot Cueing for Rotorcraft Shipboard Landings** R. Walters, J. McCandless, K. Feigh, Georgia Institute of Technology, Atlanta, GA	1100 hrs AIAA-2020-0057 **Precise Relative Navigation and Separation Assurance of UAS and Manned Aircraft during Low Altitude Airfield Operations** E. Schuster, C. Struempfel, S. Huschbeck, B. Goebel, C. Berth, M. Uijt De Haag, Technical University of Berlin, Berlin, Germany	1130 hrs AIAA-2020-0058 **Air Traffic Flow Management Enhancement Evaluation through Ground Delays and Controlled Enroute Delays** A. Andreeva-Mori, Y. Matsuno, Japan Aerospace Exploration Agency (JAXA), Tokyo, Japan	1200 hrs AIAA-2020-0059 **The influence of shape and density of exemplary city areas on the possible benefit of optimized noise abatement A-RNP and RNP-AR procedures** F. Morscheck, German Aerospace Center (DLR), Braunschweig, Germany	

Monday, 6 January 2020						
23-DE-1	Topic in Design Engineering - Innovative Designs					Celebration 4
Chaired by: N. HINES, The Boeing Company and K. BENSON, Raytheon Missile Systems						
0930 hrs AIAA-2020-0060 **Design Study of a Multi-Articulated Nodal Tailed Aircraft Using CAPS** E. Burke, Air Force Research Laboratory, Wright-Patterson AFB, OH	1000 hrs AIAA-2020-0061 **Conceptual Design of a Recovery System for Sounding Rockets Using Magnus Effect** A. Osama, M. Ahmed, Military Technical College, Cairo, Egypt	1030 hrs AIAA-2020-0062 **Drones for Borders Surveillance: Autonomous Battery Maintenance Station and Replacement for Multirotor Drones** A. Mirzaeinia, M. Hassanalian, K. Lee, New Mexico Institute of Mining and Technology, Socorro, NM	1100 hrs AIAA-2020-0063 **Arkadiko: A lunar space station mission proposal for the development of deep space exploration** C. Watson, Embry-Riddle Aeronautical University, Daytona Beach, FL; B. Clarke, Imperial College London, London, United Kingdom; A. Eilingsfeld, University of Stuttgart, Stuttgart, Germany; N. Fantinato, University of Padua, Padua, Italy; B. Hassan, Carnegie Mellon University, Pittsburgh, PA; S. Iliev, Imperial College London, London, United Kingdom; et al.	1130 hrs AIAA-2020-0064 **Mission-Oriented Additive Manufacturing of Modular Mini-UAVs** M. Bronz, French Civil Aviation University, Toulouse, France; E. Tal, Massachusetts Institute of Technology, Cambridge, MA; F. Favalli, French Civil Aviation University, Toulouse, France; S. Karaman, Massachusetts Institute of Technology, Cambridge, MA	1200 hrs AIAA-2020-0065 **Multidisciplinary Design and Control Optimization of a Spherical Robot for Planetary Exploration** H. Kalita, University of Arizona, Tucson, Tucson, AZ	

Monday, 6 January 2020

24-EDU-1	Advancing Aerospace Education I					Blue Spring II
Chaired by: R. LEBEAU, Saint Louis University and D. LANDRUM, The University of Alabama in Huntsville						
0930 hrs AIAA-2020-0066 **Progressive project-based learning program for collegiate rocket engineering** R. Spearrin, A. Nair, D. Pineda, University of California, Los Angeles, Los Angeles, CA	1000 hrs AIAA-2020-0067 **Development of Sorbitol-Based Solid Rocket Motors for Propulsion Education** K. Moody, A. Walsh, A. Ngo, S. Whyte, A. Stottlemyre, K. Rouser, Oklahoma State University, Stillwater, OK	1030 hrs AIAA-2020-0068 **Student-Faculty Research on the Combustion of Non-Conventional Fuels in Hybrid Propellant Rocket Engine in a Wide Range of Oxidizer-to-Fuel Ratios** V. Naoumov, N. Al Masoud, J. Butt, C. Correa, D. Parmelee, M. Couillard, Central Connecticut State University, New Britain, CT; et al.	1100 hrs AIAA-2020-0069 **Manufacture of solid propellant using epoxy resin and potassium nitrate** J. Rocco, M. Domingues, R. Gonçalves, E. Rosa, D. Bontorin, Technological Institute of Aeronautics (ITA), São José dos Campos, Brazil; L. Rocco Jr, Flowtest Aerospace Research, Caieiras, Brazil; et al.	1130 hrs AIAA-2020-0070 **Suborbital Payload Testing Aboard Level 3 Rocket Research Platform** N. Amberkar, V. Duraisamy, M. Mastroliberti, M. Munasinghe, G. Maupin, P. Llanos, Embry-Riddle Aeronautical University, Daytona Beach, FL; et al.	1200 hrs AIAA-2020-0071 **Failure is Not an Option: A Simulation Tool to Develop Engineering Intuition and Boost Success in Orbital Mechanics** K. Martin, S. Esse, Embry-Riddle Aeronautical University, Prescott, AZ; E. Miskioglu, Bucknell University, Lewisburg, PA	

Monday, 6 January 2020

25-EXPL-1	Mission Architectures/Robotic Missions					Bayhill 33
Chaired by: S. CHINTALAPATI, Florida Institute of Technology						
0930 hrs AIAA-2020-0072 **Integrated Orbit Design and Network-Based Optimization of Interplanetary Mission Architectures** K. Ikeya, H. Sakamoto, Tokyo Institute of Technology, Meguro, Japan; H. Chen, K. Ho, Georgia Institute of Technology, Atlanta, GA	1000 hrs AIAA-2020-0073 **Space Science and Technology Partnership Forum: Integration with Commercial In-Space Assembly Activities** G. Benjamin, A. Pensado, Analytical Mechanics Associates, Inc., Hampton, VA; D. Arney, J. Dempsey, T. Jackson, S. Jefferies, NASA Langley Research Center, Hampton, VA; et al.	1030 hrs AIAA-2020-0074 **A Parametric Case Study of the Apollo Program: Comparison of Program Alternatives Leading up to Apollo** M. Coley, I. Maynard, B. Chudoba, University of Texas, Arlington, Arlington, TX	1100 hrs AIAA-2020-0075 **Study of Swarm-based Planetary Exploration Architectures Using Agent-Based Modeling** Z. Thai, P. Balasubramani, C. Brand, A. Haines, D. DeLaurentis, Purdue University, West Lafayette, IN	1130 hrs AIAA-2020-0076 **Distributed System of Mobile Passive Tensegrity Structures** K. Wang, A. Duran, C. Gebara, N. Saltarelli, A. Ayad, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA	1200 hrs AIAA-2020-0077 **Horseshoe Orbits for Propulsion-Free Exploration of the Martian Moons** C. Lowe, University of New South Wales at the Australian Defence Force Academy, Canberra, Australia	

Monday, 6 January 2020

26-F360-1 0930 - 1130 hrs	Forum 360: Achieving Sustainable Aviation	Regency Ballroom Q

Moderator: Graham Warwick, Technology Executive Editor, Aviation Week & Space Technology

Panelists:

Brian German
National Institute of Aerospace Langley Associate Professor
Georgia Institute of Technology

James Hileman
Chief Scientific and Technical Advisor, Environment and Energy
FAA

Michael Winter
Senior Fellow, Advanced Technology
Pratt & Whitney

Jeanne Yu
Director, Technology Integration, ecoDemonstrator Program
The Boeing Company

Thomas Zill
Head, Air Vehicle Concepts
Institute for System Architectures in Aeronautics

Monday, 6 January 2020

27-FD-1	AVT-282: Aerodynamic Response of Rigid Wings in Gust Encounters I					Plaza Ballroom K
Chaired by: M. SMITH, Georgia Institute of Technology and H. BABINSKY, University of Cambridge						
0930 hrs AIAA-2020-0078 **Overview of NATO AVT-282: Unsteady Aerodynamic Response of Rigid Wings in Gust Encounters (Invited)** A. Jones, University of Maryland, College Park, College Park, MD; O. Cetiner, Istanbul Technical University, Istanbul, Turkey	1000 hrs AIAA-2020-0079 **Wing-Gust Interactions: The Effect of Transverse Velocity Profile (Invited)** I. Andreu Angulo, H. Babinsky, University of Cambridge, Cambridge, United Kingdom; H. Biler, G. Sedky, A. Jones, University of Maryland, College Park, College Park, MD	1030 hrs AIAA-2020-0080 **Physics and Computational Modeling of Nonlinear Transverse Gust Encounters (Invited)** A. Grubb, A. Moushegian, D. Heathcote, M. Smith, Georgia Institute of Technology, Atlanta, GA	1100 hrs AIAA-2020-0081 **Force prediction during transverse and vortex gust encounters (Invited)** H. Biler, A. Jones, University of Maryland, College Park, College Park, MD	1130 hrs AIAA-2020-0082 **Non-Circulatory Force on a Finite Thickness Body Encountering a Gust (Invited)** P. Gehlert, H. Babinsky, University of Cambridge, Cambridge, United Kingdom	1200 hrs AIAA-2020-0083 **Predicting unsteady flow separation in response to a flow disturbance (Invited)** K. Mulleners, J. Deparday, G. He, Swiss Federal Institute of Technology, Lausanne, Switzerland	

Monday, 6 January 2020						
28-FD-2	**AIAA-JSASS Joint Session on Martian Aerodynamics (Invited)**					**Orlando Ballroom M**
Chaired by: M. HEMATI, University of Minnesota and T. NONOMURA, Tohoku University						
0930 hrs Oral Presentation **Low Reynolds Number Aerodynamics: A Review of Problems and Some Possible Solutions (Invited)** J. Eldredge, University of California, Los Angeles, Los Angeles, CA	1000 hrs Oral Presentation **Progress in research of low Reynolds number aerodynamics for future Mars airplane (Invited)** A. Oyama, Japan Aerospace Exploration Agency (JAXA), Sagamihara, Japan; S. Kawai, University of Tokyo, Sagamihara, Japan; K. Asada, Tokyo University of Science, Katsushika, Japan	1030 hrs Oral Presentation **Marsbees: Bio-inspired Flapping Wing Flight Vehicles for Mars Exploration (Invited)** J. Pohly, J. McCain, M. Sridhar, C. Kang, D. Landrum, University of Alabama, Huntsville, Huntsville, AL; J. Bluman, U.S. Military Academy, West Point, NY; et al.	1100 hrs Oral Presentation **Overview of Recent Research Activities of the Mars Wind Tunnel at Tohoku University (Invited)** K. Asai, T. Nonomura, T. Nagata, K. Kusama, Tohoku University, Sendai, Japan	1130 hrs AIAA-2020-0084 **Optimization of Low Reynolds Number Airfoils for Martian Rotor Applications Using an Evolutionary Algorithm (Invited)** W. Koning, E. Romander, W. Johnson, NASA Ames Research Center, Moffett Field, CA	1200 hrs Oral Presentation **Experimental Studies on Effects of Mach Number and Specific Heat Ratio on Low-Reynolds-Number Airfoils (Invited)** M. Anyoji, Kyushu University, Kasuga, Japan; D. Numata, Tokai University, Hiratsuka, Japan; H. Nagai, K. Asai, Tohoku University, Sendai, Japan	

Monday, 6 January 2020						
29-FD-3	**CFD Methods I**					**Rainbow Spring II**
Chaired by: Z. WANG, University of Kansas and D. ARAYA, The Johns Hopkins University Applied Physics Laboratory						
0930 hrs AIAA-2020-0085 **A local adaptive remeshing procedure for unsteady incompressible viscous flows** E. Muller, Y. Vautrin, D. Pelletier, A. Garon, Polytechnique Montréal, Montréal, Canada	1000 hrs AIAA-2020-0086 **Sliding mesh and arbitrary periodic interface approaches for the high order FR/CPR method** Z. Duan, F. Jia, Z. Wang, University of Kansas, Lawrence, Lawrence, KS	1030 hrs AIAA-2020-0087 **Mesh Optimization via Error Sampling and Synthesis: An Update** H. Carson, S. Allmaras, M. Galbraith, D. Darmofal, Massachusetts Institute of Technology, Cambridge, MA	1100 hrs AIAA-2020-0088 **Coupled Rigid Body Motion (RBM) and Automated Grid Adaptation** C. Pleitez, P. Chun, Northrop Grumman Corporation, Redondo Beach, CA			

Monday, 6 January 2020						
30-FD-4	**Fluid Structure Interactions I**					**Blue Spring I**
Chaired by: S. BHATTACHARYA, University of Central Florida and C. BARNES, AFRL/RQVA						
0930 hrs AIAA-2020-0089 **Time-Harmonic 2D and 3D Gust-Airfoil Interactions: Comparison of Numerical Predictions with Analytical Models** M. Kazarina, V. Golubev, Embry-Riddle Aeronautical University, Daytona Beach, FL	1000 hrs AIAA-2020-0090 **PIV and surface pressure measurements on a NACA64418 airfoil undergoing stall flutter** D. Gkiolas, D. Mathioulakis, National Technical University of Athens, Athens, Greece	1030 hrs AIAA-2020-0091 **Numerical simulations of transonic flutter on a three-dimensional wing** R. Hoshi, Y. Kuya, K. Sawada, Tohoku University, Sendai, Japan				

Monday, 6 January 2020						
31-FD-5	**Turbulent Flows I**					**Rainbow Spring I**
Chaired by: O. WILLIAMS and B. SMITH, Lockheed Martin Aeronautics						
0930 hrs AIAA-2020-0092 **Experimental Study of a CFD Validation Test Case for Turbulent Separated Flows** O. Williams, M. Samuell, E. Sarwas, M. Robbins, A. Ferrante, University of Washington, Seattle, Seattle, WA	1000 hrs AIAA-2020-0093 **Comparison of turbulent boundary layer energy spectrum analyses for multiple tripping techniques** G. Severino, University of Adelaide, Adelaide, Australia; A. Silvestri, Department of Defence, Edinburgh, Australia; F. Ghanadi, University of Newcastle Australia, Callaghan, Australia; B. Cazzolato, M. Arjomandi, University of Adelaide, Adelaide, Australia	1030 hrs AIAA-2020-0094 **Artificial Thickening of a Transonic Boundary Layer in the Presence of a Pressure Gradient Associated with a Boundary Layer Ingestion Concept** G. Jones, W. Milholen, A. Elmiligui, M. Bozeman, NASA Langley Research Center, Hampton, VA; C. Cramer, Sierra Lobo, Inc., Hampton, VA; C. Cagle, NASA Langley Research Center, Hampton, VA; et al.	1100 hrs AIAA-2020-0095 **The Effect of Freestream Turbulence Integral Length Scale on Junction Flow Behavior** E. Lange, S. Lynch, Pennsylvania State University, University Park, PA			

Monday, 6 January 2020

32-FD-6	Flow Control I					Barrel Spring I
Chaired by: D. RIZZETTA, AFRL/RQVA and J. LIN, NASA-Langley Research Center						
0930 hrs AIAA-2020-0096 **Closed-Loop Control of Transition by Local Dynamic Surface Modification** D. Rizzetta, M. Visbal, Air Force Research Laboratory, Wright-Patterson AFB, OH; M. Amitay, S. Mishra, Rensselaer Polytechnic Institute, Troy, NY	1000 hrs AIAA-2020-0097 **Streamwise Evolution of Turbulent Boundary Layer Response to Active Control Actuator** M. Lozier, F. Thomas, S. Gordeyev, University of Notre Dame, Notre Dame, IN	1030 hrs AIAA-2020-0098 **Characteristics of Drag Reduced Turbulent Boundary Layers Through Pulsed-DC Actuation** A. Duong, T. Corke, F. Thomas, University of Notre Dame, Notre Dame, IN	1100 hrs AIAA-2020-0099 **Receptivity to synthetic jet actuation in boundary layer flows** A. Palumbo, University of Naples "Federico II", Naples, Italy; O. Semeraro, National Center for Scientific Research (CNRS), Orsay, France; J. Robinet, Paris Institute of Technology, Paris, France; L. de Luca, University of Naples "Federico II", Naples, Italy	1130 hrs AIAA-2020-0100 **Modal analysis of actively controlled flow past a backward facing ramp** M. Chiatto, University of Naples "Federico II", Naples, Italy; D. Hlevca, F. Grasso, Paris Institute of Technology, Paris, France; L. de Luca, University of Naples "Federico II", Naples, Italy		

Monday, 6 January 2020

33-FD-7	Hypersonic and Non-Equilibrium Flows I					Rock Spring I & II
Chaired by: D. GONZALEZ, Naval Surface Warfare Center and Y. TIAN, Los Alamos National Laboratory						
0930 hrs AIAA-2020-0101 **Modeling of Shock Propagation in Non-uniform Density Media** Y. Tian, Los Alamos National Laboratory, Los Alamos, NM; F. Jaberi, Michigan State University, East Lansing, MI; D. Livescu, Los Alamos National Laboratory, Los Alamos, NM	1000 hrs AIAA-2020-0102 **Revisit of Hypersonic Small-Disturbance Theory for Perfect Gases** J. Brazeal, A. Wuetcher, X. Wang, University of Alabama, Tuscaloosa, Tuscaloosa, AL	1030 hrs AIAA-2020-0103 **Toward Transition Modeling in a Hypersonic Boundary Layer at Flight Conditions** P. Paredes, B. Venkatachari, National Institute of Aerospace, Hampton, VA; M. Choudhari, F. Li, C. Chang, NASA Langley Research Center, Hampton, VA; M. Irfan, Virginia Polytechnic Institute and State University, Blacksburg, VA; et al.	1100 hrs AIAA-2020-0104 **Model reduction for hypersonic aerodynamics via conservative LSPG projection and hyper-reduction** P. Blonigan, K. Carlberg, Sandia National Laboratories, Livermore, CA; F. Rizzi, NexGen Analytics, Sheridan, WY; M. Howard, J. Fike, Sandia National Laboratories, Albuquerque, NM			

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34-FD-8	Instability and Transition I					Plaza Ballroom J
Chaired by: A. TUMIN, The University of Arizona and A. CHOU, NASA Langley Research Center						
0930 hrs AIAA-2020-0105 **LST and the Eigenfunction Expansion Method for Linearized Navier-Stokes Equations -- a Summary** A. Tumin, University of Arizona, Tucson, Tucson, AZ	1000 hrs AIAA-2020-0106 **Wave Packets and Supersonic Second Modes in a High-Speed Boundary Layer** A. Tumin, University of Arizona, Tucson, Tucson, AZ	1030 hrs AIAA-2020-0107 **The Role of Fluctuating Dissipative Fluxes in the Receptivity of High-Speed Reacting Binary Mixtures to Kinetic Fluctuations** K. Luna, A. Tumin, University of Arizona, Tucson, Tucson, AZ	1100 hrs AIAA-2020-0108 **Analysis of Spanwise Perturbations in Laminar Hypersonic Shock-Boundary Layer Interactions** S. Sawant, O. Tumuklu, University of Illinois, Urbana-Champaign, Urbana, IL; V. Theofilis, University of Liverpool, Liverpool, United Kingdom; D. Levin, University of Illinois, Urbana-Champaign, Urbana, IL	1130 hrs AIAA-2020-0109 **Boundary layer receptivity analysis via the algebraic Lyapunov equation** W. Ran, University of Southern California, Los Angeles, CA; A. Zare, University of Texas, Dallas, Richardson, TX; P. Hack, Stanford University, Stanford, CA; M. Jovanovic, University of Southern California, Los Angeles, CA		

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35-GNC-1 0930 - 1030 hrs	Guidance, Navigation and Control Lecture	Plaza Ballroom G
Year-Round Solar Powered Stratospheric Flight **Anthony J. Calise** Professor (Retired) Georgia Institute of Technology AIAA Fellow		

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36-GRE-1	Hybrid and Green Propulsion					Plaza Ballroom F
Chaired by: T. ABDEL-SALAM, East Carolina University and N. HICKS						
0930 hrs AIAA-2020-0117 **Nano-Electro Fuel Energy Economy and Powered Aircraft Operations** J. Lechniak, M. Salazar, W. Abbigail, J. Morello, K. Papathakis, NASA Armstrong Flight Research Center, Edwards, CA	1000 hrs AIAA-2020-0118 **Development of a Power Generation System and Quadruplex Direct Electric Drive for a Helicopter Tail Rotor** J. Booker, J. Yon, S. Williamson, D. North, P. Mellor, University of Bristol, Bristol, United Kingdom	1030 hrs AIAA-2020-0119 **Hybrid Electric-Gas Turbine Engine Design Utilizing Power Settings and Flight Paths** H. Zhu, C. Lents, L. Hardin, United Technologies Corporation, East Hartford, CT	1100 hrs AIAA-2020-0120 **Transient Cooling Approach for a Mhr Class Hybrid Electric Propulsion System Battery Pack** M. Macdonald, Y. Khakpour, C. Lents, United Technologies Corporation, East Hartford, CT	1130 hrs Oral Presentation **Flexible Al-Air Batteries for Unmanned Aerial Vehicles** A. Hu, Y. Yu, University of Tennessee, Knoxville, Knoxville, TN		

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37-GT-1	Test Measurement Techniques and Applications in Wind Tunnel Facilities					Bayhill 24
Chaired by: S. SIMERLY, NASA Glenn Research Center and T. WAYMAN, Gulfstream Aerospace Corporation						
0930 hrs AIAA-2020-0121 **Hexcomb Pattern Roughness Effects on Blunt Body Transition and Heating** B. Hollis, NASA Langley Research Center, Hampton, VA	1000 hrs AIAA-2020-0122 **Unsteady pressure measurements by means of PSP in cryogenic conditions** C. Klein, German Aerospace Center (DLR), Göttingen, Germany	1030 hrs AIAA-2020-0123 **Surface Pressure Measurements over a Free Flight Object in a Ballistic Range Facility using Two-Color Pressure-Sensitive Paint** D. Kurihara, S. Claucherty, J. Gonzales, H. Sakaue, University of Notre Dame, Notre Dame, IN; H. Kiritani, K. Fujita, Tohoku University, Sendai, Japan; et al.				

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38-GTE-1	Advanced Gas Turbine Engines and Cycles					Bayhill 22
Chaired by: I. ORISAMOLU, Pratt & Whitney and S. GOGINENI, Spectral Energies, LLC						
0930 hrs AIAA-2020-0124 **Collaborative Aircraft Engine Preliminary Design using a Virtual Engine Platform, Part B: Application** M. Vieweg, S. Reitenbach, C. Hollmann, M. Schnös, T. Behrendt, A. Krumme, German Aerospace Center (DLR), Cologne, Germany; et al.	1000 hrs AIAA-2020-0125 **Design, Analysis, and Testing of a Low-Cost, Additively-Manufactured, Single-Use Compressor** A. Bauer, F. Schauer, Air Force Institute of Technology, Wright-Patterson AFB, OH; G. Walker, University of Cincinnati, Cincinnati, OH; D. Gillaugh, Air Force Research Laboratory, Wright-Patterson AFB, OH; N. Grannan, Innovative Scientific Solutions, Inc., Dayton, OH	1030 hrs AIAA-2020-0126 **Small Engine Recuperator Testbed** K. Moosmann, J. Reinhart, J. Hoke, Innovative Scientific Solutions, Inc., Dayton, OH; A. Holley, Air Force Research Laboratory, Wright-Patterson AFB, OH	1100 hrs AIAA-2020-0127 **Development of a Small Scale Rotating Detonation Engine** J. Dechert, M. Polanka, F. Schauer, Air Force Institute of Technology, Wright-Patterson AFB, OH; S. Schumaker, Air Force Research Laboratory, Wright-Patterson AFB, OH; B. Sell, M. Fotia, Innovative Scientific Solutions, Inc., Dayton, OH	1130 hrs AIAA-2020-0128 **High-Pressure Ignition and Flame Propagation Measurements of CO_2 Diluted Natural Gas/Oxidizer Mixtures for Advanced Rocket and Gas Turbine Combustors** S. Park, G. Kim, A. Terracciano, S. Vasu, University of Central Florida, Orlando, FL	1200 hrs AIAA-2020-0129 **Laser speciation measurements during shock tube ignition of cyclic jet and rocket fuel components** R. Greene, R. Rahman, F. Arafin, S. Neupane, E. Ninnemann, S. Vasu, University of Central Florida, Orlando, FL	

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39-GTE-2	Compressors and Fans I					Bayhill 21
Chaired by: F. LOU, Purdue University and S. JAMES, Honeywell Inc.						
0930 hrs AIAA-2020-0130 **Blended Fan Blade Effects on Unsteady Aerodynamics** C. Knapke, M. Wolff, Wright State University, Dayton, OH; D. Johnston, Air Force Research Laboratory, Wright-Patterson AFB, OH	1000 hrs AIAA-2020-0131 **Rotor Blade Design Optimization for Boundary Layer Ingesting Inlet Fan** A. Wernick, J. Chen, Ohio State University, Columbus, OH	1030 hrs AIAA-2020-0132 **Analysis of Distortion Phase Shift in a Highly Loaded Fan Stage** A. Orme, D. Soderquist, S. Gorrell, Brigham Young University, Provo, UT	1100 hrs AIAA-2020-0133 **Application of Variational Asymptotic Method for Structural Analysis of Fan Rotor Blades in Boundary Layer Ingesting Flow Field** M. Gupta, M. Pokhrel, D. Hodges, D. Mavris, Georgia Institute of Technology, Atlanta, GA	1130 hrs AIAA-2020-0134 **Modeling of Centrifugal Compressor Performance Using Machine Learning Techniques** P. Cutrina Vilalta, H. Wan, University of Colorado, Colorado Springs, Colorado Springs, CO; S. Patnaik, Air Force Research Laboratory, Wright-Patterson AFB, OH		

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40-INPSI-1	Special Session: Supersonic Inlets - Honoring the Legacy of Jon Tinapple I					Silver Spring I
Chaired by: E. LOTH, University of Virginia and R. ACHARYA, CFD Research Corporation						
0930 hrs Oral Presentation **A Lockheed Martin Perspective on Working with Jon Tinapple (Invited)** D. Baruzzini, Lockheed Martin Corporation, Palmdale, CA	1000 hrs Oral Presentation **Why the Inlet Design is So Important for Good Engine Fan Performance (Invited)** M. Turner, P. Orkwis, University of Cincinnati, Cincinnati, OH	1030 hrs Oral Presentation **Shock Train Dynamics and Three-Dimensional Effects (Invited)** M. Gamba, University of Michigan, Ann Arbor, Ann Arbor, MI	1100 hrs Oral Presentation **Supersonic Inlet Testing for the X-59 (Invited)** R. Castner, NASA Glenn Research Center, Cleveland, OH	1130 hrs Oral Presentation **Buzz and Instability in High-Speed Inlets (Invited)** E. Loth, University of Virginia, Charlottesville, Charlottesville, VA	1200 hrs Oral Presentation **In-House Supersonic Inlet Research Activities in AFRL/RQV** S. Benton, Air Force Research Laboratory, Wright-Patterson AFB, OH	

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41-IS-1	Autonomy - Estimation, Planning, and Control					Celebration 10
Chaired by: A. CHAKRABARTY						
0930 hrs AIAA-2020-0135 **In-flight Kinematic Model Parameter Estimation and Adaptive Path Planning for Unmanned Aircraft** S. Benders, S. Schopferer, German Aerospace Center (DLR), Braunschweig, Germany; A. Nawrath, Technical University of Berlin, Berlin, Germany	1000 hrs AIAA-2020-0136 **Deep Reinforcement Learning Control for Aerobatic Maneuvering of Agile Fixed-Wing Aircraft** S. Clarke, I. Hwang, Purdue University, West Lafayette, IN	1030 hrs AIAA-2020-0137 **Minimum-Risk Path Planning for Long-Range and Low-Altitude Flights of Autonomous Unmanned Aircraft** S. Schopferer, S. Benders, German Aerospace Center (DLR), Braunschweig, Germany	1100 hrs AIAA-2020-0138 **Autonomous decision making for pseudo-Lagrangian drifter deployment from sUAS** C. Hirst, J. Jackson, E. Frew, University of Colorado, Boulder, Boulder, CO	1130 hrs AIAA-2020-0139 **A software architecture for autonomous taxiing of aircraft** Y. Zhang, G. Poupart-Lafarge, H. Teng, J. Wilhelm, J. Jeannin, N. Ozay, University of Michigan, Ann Arbor, Ann Arbor, MI; et al.		

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42-ISC-1 0930 - 1300 hrs	International Student Conference - Undergraduate Category	Columbia 37

AIAA-2020-0110
Volumetric Origami-based Deployable Modular Space Structures with Tailorable Stiffness
J. Lynch, J. Raney, Pennsylvania State University, State College, PA

AIAA-2020-0111
Airfoil Lift Calculation UsingWind Tunnel Wall Pressures
S. Oruganti, S. Narsipur, North Carolina State University, Raleigh, NC

AIAA-2020-0112
Active Flow Control in a Compact High-Speed Inlet/Diffuser Model
C. O'Neill, Ohio State University, Columbus, OH

AIAA-2020-0113
Thermodynamic Calculations of Boiling Liquid Expanding Vapor Explosions (BLEVE)
J. McElrath, A. Karpetis, Texas A&M University, College Station, TX

AIAA-2020-0114
Aerodynamic Analysis and Simulation of Degraded Flight Configurations of the A-10 Thunderbolt II
R. Fairchild, M. Green, T. Yechout, U.S. Air Force Academy, Gleneagle, CO

AIAA-2020-0115
Effects of Electric Field on Primary Electron Trajectories in Miniature Gridded Ion Thrusters
J. Almanza-Soto, University of California, Los Angeles, Los Angeles, CA

AIAA-2020-0116
Hypersonic Vehicle for Space Access Using Hydrocarbon Fuel
R. Palmer, University of Queensland, Brisbane, Australia

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43-ISC-2	International Student Conference - Master's Category					Columbia 35
Chaired by: J. HANSEN, HRP Systems						
0930 hrs AIAA-2020-0140 **Trim Analysis for an Electric Rotorcraft Utilizing a Moving Mass Control Scheme** R. Brown, University of Maryland, College Park, College Park, MD	1000 hrs AIAA-2020-0141 **Lagrangian Coherent Structures in Optimal Vortex Ring Formation** B. Harter, J. Gregory, Ohio State University, Columbus, OH	1030 hrs AIAA-2020-0142 **Spectral Proper Orthogonal Decmoposition Analysis of Shock-Wave/Boundary-Layer Interactions** S. Cottier, C. Combs, University of Texas, San Antonio, San Antonio, TX	1100 hrs AIAA-2020-0143 **Simulating a Vortex-Driven Cloud Feature on Uranus** K. Farmer, Saint Louis University, St. Louis, MO	1130 hrs AIAA-2020-0144 **Band Gap Optimization of Topological Waveguides** T. Gormley, University of Washington, Seattle, Seattle, WA		

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44-ISC-3	International Student Conference - Team Category					Columbia 36
Chaired by: J. HANSEN, HRP Systems						
0930 hrs AIAA-2020-0145 **Design and Integration of a High-Powered Model Rocket – I** K. Foster, P. Dohn, N. LaPierre, T. Moquin, A. Dings, C. Cooper, Worcester Polytechnic Institute, Worcester, MA; et al.	1000 hrs AIAA-2020-0146 **Implementation and Verification of a Versatile GN&C and Flight Software Architecture for an Active Control Launch System** K. Gangolli, A. Gundamraj, W. Hoppa, S. Seshan, Georgia Institute of Technology, Atlanta, GA	1030 hrs AIAA-2020-0147 **Specialized Terrestrial Rotorcraft Explorer** T. Hutchinson, N. Marquand, J. Springer, T. Swedes, S. Tandon, J. Zyck, Purdue University, West Lafayette, IN	1100 hrs AIAA-2020-0148 **Automatic Detection of Auroral Substorms from a CubeSat Platform Using Machine Learning** V. Lesser, C. Peercy, V. Siva, C. Sullivan, University of Colorado, Boulder, Boulder, CO	1130 hrs AIAA-2020-0149 **Construction of Facility for Rotating Detonation Engine Research** C. Upadhye, A. Jacob, A. Milligan, K. Chau, University of Washington, Seattle, Seattle, WA		

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45-MAT-1	Enabling Next-Generation and Multifunctional Materials					Celebration 6
Chaired by: N. YAMAMOTO, Penn State University and B. WARDLE, Massachusettes Institute of Technology						
0930 hrs AIAA-2020-0150 **Controlling the Meso-scale Assembly of CNTs/PBI Interlayers for Toughening of Thermoplastic Composites** K. Yildiz, B. Bozali, H. Cebeci, Istanbul Technical University, Istanbul, Turkey; E. Ozden Yenigun, Royal College of Art, London, United Kingdom	1000 hrs AIAA-2020-0151 **Pyroelectric Coefficient Enhancement of Macro-fiber Composites using Electric Fields** K. Acosta, University of Michigan, Ann Arbor, Ann Arbor, MI; W. Wilkie, NASA Langley Research Center, Hampton, VA; D. Inman, University of Michigan, Ann Arbor, Ann Arbor, MI	1030 hrs AIAA-2020-0152 **Strain and Damage Sensing in Polymer-Bonded Energetics through Piezoresistive MWCNT Networks** N. Shirodkar, G. Seidel, Virginia Polytechnic Institute and State University, Blacksburg, VA	1100 hrs AIAA-2020-0153 **Hierarchical CNTs Grown Multifunctional 3D Woven Composite Beams for Aerospace Applications** F. Turgut, A. Koycu, Istanbul Technical University, Istanbul, Turkey; G. Neje, B. Behera, Indian Institute of Technology Delhi, New Delhi, India; E. Ozden Yenigun, Royal College of Art, London, United Kingdom; H. Cebeci, Istanbul Technical University, Istanbul, Turkey		

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46-MAT-2	Nanostructured Materials I					Celebration 13
Chaired by: P. ACAR, Virginia Polytechnic Institute and State University and J. PINESS, Made In Space						
0930 hrs AIAA-2020-0154 **Sodium-Based Catalysis Of Carbon Nanotubes For Interlaminar Reinforcement Of Unidirectional Hierarchical Laminates** R. Li, E. Antunes, A. Liotta, L. Acauan, E. Kalfon-Cohen, K. Cui, Massachusetts Institute of Technology, Cambridge, MA; et al.	1000 hrs AIAA-2020-0155 **Cellulose Nanocrystals Assisted Process to Integrate Carbon Nanotubes in CFRP Composites** A. Kumar, S. Shariatnia, A. Asadi, Texas A&M University, College Station, TX	1030 hrs AIAA-2020-0156 **Aerospace-grade Advanced Composites with Buckling-densified Aligned Carbon Nanotubes Interlaminar Reinforcement** X. Ni, B. Wardle, Massachusetts Institute of Technology, Cambridge, MA				

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47-MDO-1	Emerging Methods, Algorithms, and Software Development in MDAO					Celebration 2
Chaired by: J. GRAY, NASA Glenn Research Center and J. CORMAN, Georgia Institute of Technology						
0930 hrs AIAA-2020-0157 **Optimisation with Intrinsic Dimension Reduction: A Ridge Informed Trust-Region Method** J. Gross, P. Seshadri, G. Parks, University of Cambridge, Cambridge, United Kingdom	1000 hrs AIAA-2020-0158 **A Data-Handling Module for the Hermes Compiler** D. Easterling, University of Dayton, Dayton, OH; R. Durscher, Air Force Research Laboratory, Wright-Patterson AFB, OH	1030 hrs AIAA-2020-0159 **Architecture Generation and Performance Evaluation of Aircraft Thermal Management Systems Through Graph-based Techniques** D. Herber, J. Allison, University of Illinois, Urbana-Champaign, Urbana, IL; R. Buettner, UES, Inc., Dayton, OH; P. Abolmoali, S. Patnaik, Air Force Research Laboratory, Wright-Patterson AFB, OH	1100 hrs AIAA-2020-0160 **Simultaneous Vehicle and Trajectory Design using Convex Optimization** B. Lin, M. Carpenter, Draper Laboratory, Cambridge, MA; O. de Weck, Massachusetts Institute of Technology, Cambridge, MA	1130 hrs AIAA-2020-0161 **Enhancing Designer Understanding by Combining Multiple Dominance Relations and Tabu Search** S. Phillips, J. Jarrett, University of Cambridge, Cambridge, United Kingdom		

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48-MDO-2	Structural Sizing and Composite Optimization					Celebration 3
Chaired by: M. HENSON, Lockheed Martin Aeronautics and V. BALABANOV, Boeing Commercial Airplanes						
0930 hrs AIAA-2020-0162 **Aero-structural Design Tool for Advanced Exhaust Systems** N. Nigam, S. Ayyalasomayajula, Y. Tang, P. Ketha, Intelligent Automation, Inc., Rockville, MD; V. Menier, R. Fenrich, Stanford University, Stanford, CA; et al.	1000 hrs AIAA-2020-0163 **Design Optimization of Short Fiber Composite Parts** N. Antunes, The Boeing Company, Huntington Beach, CA; J. Dardis-II, T. Grandine, The Boeing Company, Tukwila, WA; B. Farmer, The Boeing Company, Huntsville, AL; G. Hahn, The Boeing Company, Berkeley, MO	1030 hrs AIAA-2020-0164 **Hydrostructural Optimization of Generic Composite Hydrofoils** Y. Liao, S. He, J. Martins, Y. Young, University of Michigan, Ann Arbor, MI	1100 hrs AIAA-2020-0165 **Optimal steered Fiberpaths for a plate with a hole manufactured using AFP** A. Vijayachandran, P. Davidson, A. Waas, University of Michigan, Ann Arbor, Ann Arbor, MI	1130 hrs AIAA-2020-0166 **Structural Optimization of a Novel Flying Wing Supersonic Aircraft Configuration** N. Love, R. Kapania, Virginia Polytechnic Institute and State University, Blacksburg, VA		

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49-MST-1	Augmented and Virtual Reality Technologies I - Human Factors and Training (Invited)					Coral Spring II
Chaired by: D. POOL, Delft University of Technology and P. ZAAL, NASA Ames Research Center						
0930 hrs AIAA-2020-0167 **Training Astronauts using Hardware-in-the-Loop Simulations and Virtual Reality (Invited)** A. Garcia, J. Schlueter, E. Paddock, NASA Johnson Space Center, Houston, TX	1000 hrs AIAA-2020-0168 **Evaluation of Pre-Flight and On Orbit Training Methods Utilizing Virtual Reality (Invited)** N. McHenry, T. Hunt, W. Young, A. Gardner, U. Bhagavatula, B. Bontz, Texas A&M University, College Station, TX; et al.	1030 hrs AIAA-2020-0169 **Augmented Eye: From theory to practice (Invited)** J. Vlasblom, J. Rooij, National Aerospace Laboratory (NLR), Amsterdam, The Netherlands	1100 hrs AIAA-2020-0170 **Comparing Virtual Reality to Conventional Simulator Visuals: Effects of Peripheral Visual Cues in Roll-Axis Tracking Tasks (Invited)** L. Terenzi, P. Zaal, San Jose State University, Moffett Field, CA	1130 hrs AIAA-2020-0171 **Rotational and Translational Velocity and Acceleration Thresholds for the Onset of Cybersickness in Virtual Reality (Invited)** L. Terenzi, P. Zaal, San Jose State University, Moffett Field, CA	1200 hrs **Open Discussion**	

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50-NDA-1 0930 - 1030 hrs	Non-Deterministic Approaches Lecture	Orlando Ballroom N

The Role of Sensitivity Analysis and Uncertainty Quantification for Engineering Models
Ralph C. Smith
Distinguished University Professor
Department of Mathematics
North Carolina State University

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51-PC-1	Combustion Dynamics I					Bayhill 25
Chaired by: T. LIEUWEN, Georgia Institute of Technology and C. ARNDT						
0930 hrs AIAA-2020-0172 **Influence of Combustion on Flow-Structures and Cross-Frequency Coupling in a Pressurized Gas Turbine Model Combustor** M. Passarelli, T. Wabel, University of Toronto, Toronto, Canada; K. Venkatesan, A. Cross, General Electric Company, Niskayuna, NY; A. Steinberg, Georgia Institute of Technology, Atlanta, GA	1000 hrs AIAA-2020-0173 **Characterization of Pressure Oscillations at the Approach of Combustion Instabilities** T. Yi, C. Fugger, S. Roy, Spectral Energies, LLC, Beavercreek, OH; A. Caswell, D. Talley, Air Force Research Laboratory, Wright-Patterson AFB, OH	1030 hrs AIAA-2020-0174 **Experimental Investigation of Fuel Chemistry on Combustion Instabilities in a Premixed Bluff-Body Combustor** B. Paxton, Innovative Scientific Solutions, Inc., Dayton, OH; C. Fugger, A. Tomlin, Spectral Energies, LLC, Dayton, OH; A. Caswell, Air Force Research Laboratory, Wright-Patterson AFB, OH	1100 hrs AIAA-2020-0175 **SBES/FGM Simulation of Forced Response of a Premixed Bluff-Body Stabilized Flame** Y. Xia, ANSYS, Inc., Milton, United Kingdom; I. Verma, K. Zore, ANSYS, Inc., Pune, India; P. Sharkey, ANSYS, Inc., Milton, United Kingdom		

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52-PC-2	Combustion Kinetics I					Bayhill 26
Chaired by: E. PETERSEN, Texas A&M University and D. BLUNCK, Oregon State University						
0930 hrs AIAA-2020-0176 **Skeletal Chemical Kinetics Mechanisms for Plasma-Assisted Combustion** A. Bellemans, N. Deak, F. Bisetti, University of Texas, Austin, Austin, TX	1000 hrs AIAA-2020-0177 **Reduced Models for Chemical Kinetics derived from Parallel Ensemble Simulations of Stirred Reactors** P. Zhang, R. Sankaran, M. Stoyanov, D. Lebrun-Grandie, C. Finney, Oak Ridge National Laboratory, Oak Ridge, TN	1030 hrs AIAA-2020-0178 **Effects of F-24/ATJ blend composition on ignition kinetics at low temperatures** K. Kim, K. Min, University of Illinois, Urbana-Champaign, Urbana, IL; J. Temme, C. Kweon, Army Research Laboratory, Aberdeen Proving Ground, MD; T. Lee, University of Illinois, Urbana-Champaign, Urbana, IL	1100 hrs AIAA-2020-0179 **Ozone-Enhanced Flame Propagation of Alkane/Alkene/Air Mixtures** C. Reuter, T. Ombrello, Air Force Research Laboratory, Wright-Patterson AFB, OH	1130 hrs AIAA-2020-0180 **Study of ozone sensitized diethyl carbonate oxidation at low and intermediate temperatures** H. Zhao, S. Liu, C. Yan, Y. Ju, Princeton University, Princeton, NJ	1200 hrs AIAA-2020-0181 **Deep Learning for Scalable Chemical Kinetics** A. Sharma, R. Johnson, D. Kessler, A. Moses, Naval Research Laboratory, Washington, D.C.	

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53-PDL-1	Diagnostics					Bayhill 20
Chaired by: R. MILES, Texas A&M University						
0930 hrs AIAA-2020-0182 **Electric Field Measurements in Atmospheric Pressure Plasmas By Ns and Ps Electric Field Induced Second Harmonic Generation** I. Adamovich, K. Orr, Ohio State University, Columbus, OH	1000 hrs AIAA-2020-0183 **N-atom Production at High Electric Fields: E-FISH and TALIF Experiments for Understanding Fast Ionization Wave Kinetics** T. Chng, I. Orel, École Polytechnique, Palaiseau, France; I. Adamovich, Ohio State University, Columbus, OH; N. Popov, Moscow State University, Moscow, Russia; S. Starikovskaia, École Polytechnique, Palaiseau, France	1030 hrs AIAA-2020-0184 **Microwave Detection of REMPI for Diagnostics of Densities of Gaseous Species in Mixtures at Elevated Pressures** A. Sharma, M. Slipchenko, K. Rahman, Purdue University, West Lafayette, IN; M. Shneider, Princeton University, Princeton, NJ; A. Shashurin, Purdue University, West Lafayette, IN	1100 hrs AIAA-2020-0185 **Low-Pressure Plasma Effects on the Radar REMPI Diagnostic** C. Galea, M. Shneider, A. Dogariu, Princeton University, Princeton, NJ; R. Miles, Texas A&M University, College Station, TX	1130 hrs AIAA-2020-0186 **Investigation of Atmospheric Pressure CO_2 Plasma Using Polarization Spectroscopy** A. Meindl, J. Beyer, S. Loehle, I. Kistner, A. Schulz, S. Fasoulas, University of Stuttgart, Stuttgart, Germany		

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54-PDL-2	Perspectives on Plasma Assisted Combustion (Invited)					Bayhill 31
Chaired by: A. STARIKOVSKIY, Princeton University						
0930 hrs Oral Presentation **Plasma-Assisted Combustion: AFOSR-Supported Basic Research 1996-2014** J. Tishkoff, Air Force Office of Scientific Research, Arlington, VA		1030 hrs Oral Presentation **Selective Generation of Metastable Excited Species in Hybrid Plasmas for Plasma Assisted Combustion and Plasma Catalysis Applications** I. Adamovich, E. Jans, K. Frederickson, I. Gulko, Ohio State University, Columbus, OH	1100 hrs Oral Presentation **Plasma chemical instability: A new way to control plasma assisted ignition** Y. Ju, H. Zhong, A. Rousso, B. Goldberg, M. Shneider, Princeton University, Princeton, NJ	1130 hrs Oral Presentation **Status and Perspectives on flame stabilization by nanosecond discharges** C. Laux, CentraleSupélec, Châtenay-Malabry, France	1200 hrs Oral Presentation **Physics and Chemistry of High-Temperature Plasma Assisted Combustion** A. Starikovskiy, Princeton University, Princeton, NJ	

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55-PDL-3	Space Propulsion					Bayhill 30
Chaired by: K. XU, University of Alabama in Huntsville and A. SHASHURIN, Purdue University, School of Aeronautics and Astronautics						
0930 hrs AIAA-2020-0187 **Simulation of Ionic Liquid in Electrospray Thrusters** J. Jones, T. Moeller, University of Tennessee, Tullahoma, Tullahoma, TN	1000 hrs AIAA-2020-0188 **Liquid-Fed Electromagnetic Accelerator for Nanosatellite Applications** A. Patel, Y. Zhang, A. Shashurin, Purdue University, West Lafayette, IN	1030 hrs AIAA-2020-0189 **100,000hrs of On-Orbit Electric Propulsion and MAXAR's First Electric Orbit Raising** I. Johnson, G. Santiago, J. Li, J. Baldwin, Maxar, Palo Alto, CA	1100 hrs AIAA-2020-0190 **Measurements of the Characteristics of Plasma Plume Generated by Low Energy Surface Flashover** Y. Zhang, A. Patel, A. Shashurin, Purdue University, West Lafayette, IN	1130 hrs AIAA-2020-0191 **Characterization of a Quasi-Steady Self-Field MPD Thruster with Various Electrode Configurations** S. Tauchi, Graduate University for Advanced Studies, Sagamihara, Japan; Y. Oshio, Ryukoku University, Otsu, Japan; A. Kawasaki, Nagoya University, Nagoya, Japan; I. Funaki, Japan Aerospace Exploration Agency (JAXA), Sagamihara, Japan	1200 hrs AIAA-2020-0192 **Feasibility study of laser propulsion system for launch demonstration and generation of laser sustained plasma as heat source** T. Kamei, R. Niwa, K. Ishikawa, M. Matsui, Shizuoka University, Hamamatsu, Japan; K. Mori, Nagoya University, Nagoya, Japan	

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56-PGC-1	Pressure Gain Combustion: Rotating Detonation Rocket Engines I					Manatee Spring I
Chaired by: D. PAXSON, NASA Glenn Research Center and S. CLAFLIN, Aerojet Rocketdyne						
0930 hrs AIAA-2020-0193 **Ideal Thermodynamic Performance Results for Rotating Detonation Rocket Engine Thrust Chambers Using CEA** E. Paulson, Air Force Research Laboratory, Edwards AFB, CA; R. Kimura, ERC, Inc., Edwards AFB, CA; W. Hargus, V. Sankaran, Air Force Research Laboratory, Edwards AFB, CA	1000 hrs AIAA-2020-0194 **Laboratory Flow Measurement in Rotating Detonation Rocket Engines** T. Rathsack, Air Force Research Laboratory, Edwards AFB, CA; B. Bigler, ERC, Inc., Edwards AFB, CA; J. Bennewitz, S. Danczyk, W. Hargus, Air Force Research Laboratory, Edwards AFB, CA	1030 hrs AIAA-2020-0195 **Experimental Testing of an RP-2-GOX Rotating Detonation Rocket Engine** D. Lim, J. Humble, S. Heister, Purdue University, West Lafayette, IN	1100 hrs AIAA-2020-0196 **Further Experimental Study of a Hypergolically-Ignited Liquid-Liquid Rotating Detonation Rocket Engine** S. Kubicki, Purdue University, West Lafayette, IN; W. Anderson, Arnold Engineering Development Complex, Arnold AFB, TN; S. Heister, Purdue University, West Lafayette, IN	1130 hrs AIAA-2020-0197 **Exploration of Nozzle Flow Circumferential Attenuation and Efficient Expansion for Rotating Detonation Rocket Engines** J. Sosa, Z. Berry, R. Burke, K. Ahmed, University of Central Florida, Orlando, FL; D. Micka, Creare, Inc., Hanover, NH	1200 hrs AIAA-2020-0198 **Experimental Validation of Nozzle Flow Simulations for Rocket Application Rotating Detonation Engines** A. Harroun, S. Heister, Purdue University, West Lafayette, IN; J. Ruf, NASA Marshall Space Flight Center, Huntsville, AL	

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57-PGC-2/PC-3	Pressure Gain Combustion: Combustor Testing, Operability, and Performance I					Manatee Spring II
Chaired by: E. BACH, TU Berlin and V. TANGIRALA, General Electric						
0930 hrs AIAA-2020-0199 **RDC Operation and Performance with Varying Air Injector Pressure Loss** E. Bach, C. Paschereit, P. Stathopoulos, M. Bohon, Technical University of Berlin, Berlin, Germany	1000 hrs AIAA-2020-0200 **Detonation Confinement using a Flat Channel Plate in a Radial Rotating Detonation Engine** K. Muraleetharan, M. Polanka, F. Schauer, Air Force Institute of Technology, Wright-Patterson AFB, OH; R. Huff, Air Force Research Laboratory, Wright-Patterson AFB, OH	1030 hrs AIAA-2020-0201 **Characterization and Examination of Performance Parameters of Back-Pressurized RDCs** A. Geller, A. Zahn, J. Jodele, V. Anand, E. Gutmark, University of Cincinnati, Cincinnati, OH	1100 hrs AIAA-2020-0202 **Combustion Pressure Distributions and Thrust Performances in Small Cylindrical Rotating Detonation Engines** R. Yokoo, K. Goto, A. Kawasaki, K. Matsuoka, J. Kasahara, Nagoya University, Nagoya, Japan; A. Matsuo, Keio University, Yokohama, Japan; et al.	1130 hrs AIAA-2020-0203 **On the Heat Flux Distributions from Supersonic Combustion in a Rotating Detonation Engine Model** F. Ladeinde, Stony Brook University, Stony Brook, NY; S. Jacobs, State University of New York, Song-do, South Korea	1200 hrs AIAA-2020-0204 **Experimental measurements of NOx emissions in a Rotating Detonation Engine** D. Ferguson, National Energy Technology Laboratory, Morgantown, WV; B. O'Meara, Pennsylvania State University, University Park, PA; A. Roy, K. Johnson, National Energy Technology Laboratory, Morgantown, WV	

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58-SCS-1	High Strain Composite and Inflatable Space Structures					Celebration 12
Chaired by: S. BRADFORD, Jet Propulsion Laboratory and B. DAVIS, Roccor LLC						
0930 hrs AIAA-2020-0205 **Stowage and Recovery of Thin-ply Composite Deployable Structures** A. Gomez-Delrio, K. Kwok, University of Central Florida, Orlando, FL	1000 hrs AIAA-2020-0206 **Thin-Ply Thermoplastic Composites for Foldable Structures** A. Schlothauer, N. Schwob, G. Pappas, P. Ermanni, Swiss Federal Institute of Technology, Zürich, Switzerland	1030 hrs AIAA-2020-0207 **Experimental Study of Time-dependent Failure of High Strain Composites** K. Ubamanyu, A. Hasanyan, S. Pellegrino, California Institute of Technology, Pasadena, CA	1100 hrs AIAA-2020-0208 **Tensile fiber failure on High Strain Composites** A. Sharma, S. Hill, R. Perez, University of Colorado, Boulder, Boulder, CO; T. Rose, Roccor, LLC, Longmont, CO; F. Lopez Jimenez, University of Colorado, Boulder, Boulder, CO	1130 hrs AIAA-2020-0209 **Design and Testing of a Gateway Inflatable Airlock for the eXploration HABitat Academic Innovation Challenge** J. Jacob, J. Brenner, A. Quinton, B. White, Oklahoma State University, Stillwater, OK	1200 hrs AIAA-2020-0210 **New Folding Concept on the Cylindrical Structure with Yoshimura Pattern: Folding pattern analysis** J. Suh, T. Kim, J. Han, Korea Advanced Institute of Science and Technology, Daejeon, South Korea	

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59-SD-1	Adaptive Aeroelastic Wing Shaping Control I					Celebration 1
Chaired by: N. NGUYEN, NASA-Ames Research Center and W. SU, University of Alabama, Tuscaloosa						
0930 hrs AIAA-2020-0211 **Development of an Aeroservoelastic Model for Gust Load Alleviation of the NASA Common Research Model Wind Tunnel Experiment** N. Cramer, N. Nguyen, NASA Ames Research Center, Moffett Field, CA	1000 hrs AIAA-2020-0212 **Simulation and Modeling of Flow Generated by Gust Generator in a Wind Tunnel** N. Nguyen, NASA Ames Research Center, Moffett Field, CA; J. Xiong, Stinger Ghaffarian Technologies, Inc., Moffett Field, CA; N. Cramer, NASA Ames Research Center, Moffett Field, CA	1030 hrs AIAA-2020-0213 **Multi-Objective Gust Load Alleviation Control Designs for an Aeroelastic Wind Tunnel Demonstration Wing** M. Drew, K. Hashemi, N. Cramer, J. Xiong, N. Nguyen, NASA Ames Research Center, Moffett Field, CA	1100 hrs AIAA-2020-0214 **Progress on Gust Load Alleviation Wind Tunnel Experiment and Aeroservoelastic Model Validation for a Flexible Wing with Variable Camber Continuous Trailing Edge Flap System** N. Nguyen, N. Cramer, K. Hashemi, NASA Ames Research Center, Moffett Field, CA; M. Drew, J. Xiong, Stinger Ghaffarian Technologies, Inc., Moffett Field, CA; T. Mundt, University of Washington, Seattle, Seattle, CA; et al.	1130 hrs AIAA-2020-0215 **Structural and Aerodynamic Models for Aeroelastic Analysis of Corrugated Morphing Wings** N. Tsushima, H. Arizono, Japan Aerospace Exploration Agency (JAXA), Tokyo, Japan; K. Soneda, T. Yokozeki, T. Imamura, University of Tokyo, Tokyo, Japan; W. Su, University of Alabama, Tuscaloosa, Tuscaloosa, AL		

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60-SE-1	**Systems Engineering I**					**Celebration 15**
Chaired by: M. BAILEY and M. SIEVERS, Jet Propulsion Laboratory						
0930 hrs AIAA-2020-0216 **A modern approach to managing complex multi-protocol network definitions throughout the product development lifecycle** T. Magisos, Applied Dynamics International, Ann Arbor, MI	1000 hrs AIAA-2020-0217 **Suggestions for Reframing Failure in Aerospace Systems Development** D. DeTurris, L. Davis, California Polytechnic State University, San Luis Obispo, CA	1030 hrs AIAA-2020-0218 **Modeling Architectures and Parameterization for Spacecraft** M. Grande, A. Patel, L. Durbin, D. DeLaurentis, Purdue University, West Lafayette, IN	1100 hrs AIAA-2020-0219 **Cost-Effective Control of Unmanned Aircraft Systems** C. Mirchandani, George Washington University, Washington, D.C.	1130 hrs AIAA-2020-0220 **Application of the Complex Systems Sustainment Model to Global Climate Control** C. Vono, Self, Ogden, UT		

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61-SFM-1	**Asteroid and Non-Earth Orbiting Missions I**					**Bayhill 29**
Chaired by: A. BOUTONNET, European Space Agency (ESA)						
0930 hrs AIAA-2020-0221 **Temporary Capture of Asteroid Ejecta into Periodic Orbits: Application to JAXA's Hayabusa2 Impact Event** D. Villegas-Pinto, Delft University of Technology, Delft, The Netherlands; S. Soldini, Y. Tsuda, Japan Aerospace Exploration Agency (JAXA), Kanagawa, Japan; J. Heiligers, Delft University of Technology, Delft, The Netherlands	1000 hrs AIAA-2020-0222 **Considering Deflection Missions for Asteroid Impact Risk** C. Rumpf, D. Mathias, L. Wheeler, J. Dotson, NASA Ames Research Center, Moffett Field, CA	1030 hrs AIAA-2020-0223 **Exploring Long-Period Comets from Multiple Staging Orbits** G. Prescinotti Vivan, J. Hudson, Western Michigan University, Kalamazoo, MI	1100 hrs AIAA-2020-0224 **Impact-Geometry Maps; Visualization of Kinetic Impact Effectiveness for Asteroid Deflection Missions** K. Yamaguchi, R. Hayama, K. Miyata, S. Hara, Nagoya University, Nagoya, Japan	1130 hrs AIAA-2020-0225 **Image-based Autonomous Navigation of Hayabusa2 using Artificial Landmarks: Design and In-Flight Results in Landing Operations on Asteroid Ryugu** N. Ogawa, F. Terui, Japan Aerospace Exploration Agency (JAXA), Sagamihara, Japan; S. Yasuda, K. Matsushima, T. Masuda, J. Sano, NEC Corporation, Fuchu, Japan; et al.	1200 hrs AIAA-2020-0226 **Tracking Reference Orbits Around Asteroids with Unknown Gravitational Parameters Using a Nonlinear Adaptive Controller** M. Tiwari, R. Prazenica, T. Henderson, Embry-Riddle Aeronautical University, Daytona Beach, FL	

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62-SFM-2	**Orbit Determination and Estimation Theory I**					**Bayhill 28**
Chaired by: M. MEEK						
0930 hrs AIAA-2020-0227 **Estimation of Stochastic Events for Vehicles in NRHOs** J. Greaves, D. Scheeres, University of Colorado, Boulder, Boulder, CO	1000 hrs AIAA-2020-0228 **Efficient method for approximating nonlinear dynamics: applications to uncertainty propagation and estimation** J. Roa, R. Park, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA	1030 hrs AIAA-2020-0229 **Orion Optical Navigation Testing and Performance** C. D'Souza, NASA Johnson Space Center, Houston, TX; K. Smith, Draper Laboratory, Houston, TX; R. Inman, NASA Johnson Space Center, Houston, TX	1100 hrs AIAA-2020-0230 **Geostationary Satellite Constellation Tracking and Identification Using Normalized Cross Correlation** D. Zuehlke, T. Henderson, Embry-Riddle Aeronautical University, Daytona Beach, FL			

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63-SFM-3	**Space Situational Awareness, Conjunction Analysis, and Collision Avoidance I**					**Bayhill 27**
Chaired by: B. JONES, University of Texas at Austin						
0930 hrs AIAA-2020-0231 **Continuous-thrust collision avoidance manoeuvres optimization** G. Salemme, Technical University of Milan, Milan, Italy; R. Armellin, University of Surrey, Guildford, United Kingdom; P. Di Lizia, Technical University of Milan, Milan, Italy	1000 hrs AIAA-2020-0232 **Atmospheric Density Uncertainty Quantification for Satellite Conjunction Assessment** D. Gondelach, R. Linares, Massachusetts Institute of Technology, Cambridge, MA	1030 hrs AIAA-2020-0233 **Compensation of Atmospheric Differential Color Refraction Bias in Ground-Based Optical Astrometric Observations of Satellites with Concurrent Spectroscopic Measurements** R. Geykhman, Lincoln Laboratory, Massachusetts Institute of Technology, Lexington, MA; K. Cahoy, Massachusetts Institute of Technology, Cambridge, MA	1100 hrs AIAA-2020-0234 **Stochastic Optimization Framework for Spacecraft Maneuver Detection** A. Dutta, Wichita State University, Wichita, KS; J. Raquepas, Air Force Research Laboratory, Rome, NY	1130 hrs AIAA-2020-0235 **Space Objects Maneuvering Prediction via Maximum Causal Entropy Inverse Reinforcement Learning** B. Doerr, R. Linares, Massachusetts Institute of Technology, Cambridge, MA; R. Furfaro, University of Arizona, Tucson, Tucson, AZ	1200 hrs AIAA-2020-0236 **Formation Flying as a Framework for Space Traffic Management** B. Flewelling, C. Ingram, P. Cunio, ExoAnalytic Solutions, Inc., Foothill Ranch, CA	

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64-SOF-1	Techniques for Development and V&V of Aerospace Software					Celebration 9
Chaired by: M. RUBIN, Red Canyon Engineering & Software and J. PAUNICKA, Boeing						
0930 hrs AIAA-2020-0237 **Critical Software For Human Spaceflight: Orion Propulsion Software from Development to Qualification** A. Preden, ESA, Noordwijk, The Netherlands; J. Kaschner, F. Rettig, Airbus, Bremen, Germany; M. Rodriggs, NASA Johnson Space Center, Houston, TX	1000 hrs AIAA-2020-0238 **Challenges and Opportunities for Software Development and Verification on Military Aircraft Systems** S. Cook, G. Haverkamp, Northrop Grumman Corporation, Melbourne, FL	1030 hrs AIAA-2020-0239 **RESTful Software Architecture for ROS-based Onboard Mission System for Drones** S. Gupta, Clausthal University of Technology, Clausthal-Zellerfeld, Germany; U. Durak, German Aerospace Center (DLR), Braunschweig, Germany	1100 hrs AIAA-2020-0240 **A Framework for the Analysis of Deep Neural Networks in AeroSpace applications using Bayesian Statistics** Y. He, NASA Ames Research Center, Moffett Field, CA; J. Schumann, Stinger Ghaffarian Technologies, Inc., Moffett Field, CA	1130 hrs AIAA-2020-0241 **Applying NASA IV&V Methodologies to Commercial Aircraft Flight Software** M. Rubin, Red Canyon Engineering & Software, Denver, CO	1200 hrs AIAA-2020-0242 **Safety Versus Security in Aviation, Comparing DO-178C with Security Standards** C. Torens, German Aerospace Center (DLR), Braunschweig, Germany	

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65-STR-1	Aircraft Structural Design, Test and Optimization I					Celebration 14
Chaired by: V. GOYAL, Lockheed Martin Aeronautics Company and A. CHATTOPADHYAY, Arizona State University						
0930 hrs AIAA-2020-0243 **Static Loads Testing of a High Aspect Ratio Tow-Steered Wingbox** C. Jutte, Craig Technologies, Inc., Merritt Island, FL; C. Wieseman, A. Lovejoy, B. Stanford, NASA Langley Research Center, Hampton, VA	1000 hrs AIAA-2020-0244 **Simulation and Experimentation of Pulsed Eddy Current Thermography for Corrosion Detection Under Insulation** J. Hernandez, K. Vo, S. Raghavan, University of Central Florida, Orlando, FL	1030 hrs AIAA-2020-0245 **Exact Solution for the Deflection of Composite Beams Under Non-Uniformly Distributed Loads** O. Doeva, P. Khaneh Masjedi, P. Weaver, University of Limerick, Limerick, Ireland	1100 hrs AIAA-2020-0246 **Lesson Learned from Recent Space Flight Assessments** J. Smith, NASA Johnson Space Center, Houston, TX; K. Hamm Jr, NASA Ames Research Center, Moffett Field, CA; K. Imtiaz, NASA Johnson Space Center, Houston, TX; I. Raju, NASA Langley Research Center, Hampton, VA	1130 hrs AIAA-2020-0247 **Morphing Composite Cylindrical Lattices: Thermal Effects and Actuation** C. McHale, S. Carey, D. Hadjiloizi, P. Weaver, University of Limerick, Limerick, Ireland		

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66-STR-2	Characterization and Failure Prediction of Composite Structures I					Celebration 5
Chaired by: S. CLAY, Air Force Research Laboratory and J. ACTION, Lockheed Martin Aeronautics						
0930 hrs AIAA-2020-0248 **Investigating Surface and Sub-Surface Damage in IM7/8552 via in-situ Synchrotron X-ray Computed Tomography** I. Hanhan, Purdue University, West Lafayette, IN; F. De Carlo, Argonne National Laboratory, Lemont, IL; M. Sangid, Purdue University, West Lafayette, IN	1000 hrs AIAA-2020-0249 **Finite element based damage and failure analysis of honeycomb core sandwich composite structures for space applications** K. Venkatesan, A. Rai, Arizona State University, Tempe, AZ; T. Stoumbos, D. Inoyama, Northrop Grumman Corporation, Dulles, VA; A. Chattopadhyay, Arizona State University, Tempe, AZ	1030 hrs AIAA-2020-0250 **An Investigation on the Accuracy of Delamination Analysis Predictions for Unidirectional Laminate Configurations** P. Enjuto, G. Mabson, H. Lee, The Boeing Company, Seattle, WA; R. Krueger, National Institute of Aerospace, Hampton, VA; J. Ratcliffe, NASA Langley Research Center, Hampton, VA	1100 hrs AIAA-2020-0251 **Compressive response of composite laminates with defects** X. Cui, A. Karuppiah, D. Pham, J. Lua, Global Engineering and Materials, Inc., Princeton, NJ; C. Saathoff, W. Seneviratne, Wichita State University, Wichita, KS	1130 hrs AIAA-2020-0252 **Discrete Crack Informed Continuum Damage Mechanics Model in Composite Laminates** X. Cui, J. Lua, Global Engineering and Materials, Inc., Princeton, NJ	1200 hrs AIAA-2020-0253 **The Role of Proof Test in the Substantiation of Space Vehicles** V. Goyal, S. Maghsoudy-Louyeh, S. Svetlik-Haley, J. Rome, The Aerospace Corporation, El Segundo, CA	

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67-TP-1	Thermal Protection Systems: Modeling I					Plaza Ballroom E
Chaired by: K. WEED, Ball Aerospace & Technologies Corporation and A. MARTIN, University of Kentucky						
0930 hrs AIAA-2020-0254 **Modeling Heatshield Erosion due to Dust Particle Impacts for Martian Entries** G. Palmer, Analytical Mechanics Associates, Inc., Moffett Field, CA; E. Ching, M. Ihme, Stanford University, Stanford, CA; D. Kerkhoff, A. Guelhan, German Aerospace Center (DLR), Cologne, Germany	1000 hrs AIAA-2020-0255 **Modified Chemical Kinetic Parameters for Aerothermal Simulations of Entry into Hydrogen Atmospheres** S. Poovathingal, A. Carroll, S. Chen, I. Boyd, University of Michigan, Ann Arbor, Ann Arbor, MI	1030 hrs AIAA-2020-0256 **Numerical Study of Material Uncertainties in Thermal and Structural Responses in Charring Ablation** R. Fu, S. McDaniel, M. Beck, A. Martin, University of Kentucky, Lexington, Lexington, KY	1100 hrs AIAA-2020-0257 **Quasi-Steady Thermoelastic Modeling of Woven Thermal Protection Systems** D. Dang, University of Michigan, Ann Arbor, Ann Arbor, MI; E. Stern, NASA Ames Research Center, Moffett Field, CA; I. Boyd, University of Michigan, Ann Arbor, Ann Arbor, MI	1130 hrs AIAA-2020-0258 **A Practical Approach to Sizing Thermal Protection for SpaceShipTwo** A. Orchard, J. Vogel, E. Coffin, Spaceship Company, Mojave, CA		

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68-UAS-1	Unmanned Aircraft System: Design, Safety, and Human-Machine Interfaces I					Celebration 16
Chaired by: M. LOGAN, NASA Langley Research Center						
0930 hrs AIAA-2020-0259 **Aeropropulsive Evaluation of Boundary Layer Ingestion for Medium Electric-Powered UAVs** E. Valencia, M. Ayala, V. Hidalgo, S. Simbaña, V. Alulema, National Polytechnic School, Quito, Ecuador	1000 hrs AIAA-2020-0260 **Modelling and Performance Impact of Different Battery Architectures for Fixed-Wing eVTOL UAV** P. Stahl, C. Roessler, M. Hornung, Technical University of Munich, Munich, Germany	1030 hrs AIAA-2020-0261 **Self-learning MAV Under Safety-guaranteed Flight Test Environment** Y. Sung, H. Kim, J. Han, Korea Advanced Institute of Science and Technology, Daejeon, South Korea; D. Lee, Korea National University of Transportation, Chungju, South Korea	1100 hrs AIAA-2020-0262 **Human-in-the-Loop Flight Simulation Experiment on Unmanned Aircraft Terminal Operations** D. Jack, K. Hoffler, Adaptive Aerospace Group, Inc., Hampton, VA; R. Roper, A. Trujillo, T. Lewis, S. KC, NASA Langley Research Center, Hampton, VA; et al.			

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69-GNC-2 1030 - 1230 hrs	GN&C Social and Graduate Student Paper Competition	Plaza Ballroom G
This is a special event for GN&C attendees to socialize, and hear from top students during the GN&C Graduate Student Paper Competition.		

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70-ICME-1 1030 - 1230 hrs	Tutorial on Verification and Validation Best Practices	Orlando Ballroom N
Presentations by: **David Riha** Southwest Research Institute **Mark Benedict** AFRL Materials and Manufacturing Directorate		

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71-LUNCH-1 1230 - 1400 hrs	Durand Lecture for Public Service and Lunch Reception	Windermere Ballroom
Space Technology: An Investment in Our Future **Robert D. Braun** University of Colorado Boulder Following the lecture, network with fellow attendees during a lunch reception and have the opportunity to speak with Robert Braun. This event has been sponsored by Lockheed Martin Corporation.		

Monday, 6 January 2020

72-ICME-4 1245 - 1400 hrs	ICME Lunch and Learn	Celebration 7
Grab your lunch and come and learn what ICME is all about! We will define ICME and discuss what is going on this week with respect to ICME activities. Review 2040 Vision Roadmap for Integrated Multiscale Modeling and Simulation of Materials and Systems, describe the ICME Prize Contest rules, and have an open Q&A session.		

Monday, 6 January 2020

73-AA-2	Special Session: Community Noise Impact from Supersonic Transports					Peacock Spring
Chaired by: D. HUFF, NASA Glenn Research Center and S. RIZZI, NASA Langley Research Center						
1400 hrs Oral Presentation **Community Noise Impact from Supersonic Transports - Introduction** D. Huff, NASA Glenn Research Center, Cleveland, OH	1430 hrs AIAA-2020-0263 **Supersonic Technology Concept Aeroplanes for Environmental Studies** J. Berton, D. Huff, NASA Glenn Research Center, Cleveland, OH; K. Geiselhart, NASA Langley Research Center, Hampton, VA; J. Seidel, NASA Glenn Research Center, Cleveland, OH	1500 hrs Oral Presentation **Scale Model Jet Tests for Learjet Flyover Data** B. Henderson, D. Huff, NASA Glenn Research Center, Cleveland, OH	1530 hrs AIAA-2020-0264 **Acoustic Measurements of Co-annular Jets at High Subsonic-Low Supersonic Jet Velocities** R. Auhl, S. Willoughby, D. McLaughlin, P. Morris, Pennsylvania State University, University Park, PA	1600 hrs AIAA-2020-0265 **System Noise Assessment of NASA Supersonic Technology Concept Aeroplane Using JAXA's Noise Prediction Tool** J. Akatsuka, Japan Aerospace Exploration Agency (JAXA), Mitaka, Japan; T. Ishii, Japan Aerospace Exploration Agency (JAXA), Chofu, Japan	1630 hrs AIAA-2020-0266 **Auralization of a Supersonic Business Jet Using Advanced Takeoff Procedures** S. Rizzi, NASA Langley Research Center, Hampton, VA; J. Berton, NASA Glenn Research Center, Cleveland, OH; B. Tuttle, Analytical Mechanics Associates, Inc., Hampton, VA	

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74-ACD-4	Aircraft Configuration Design Studies					Orlando Ballroom L
Chaired by: J. MERRET, University of Illinois at Urbana-Champaign and A. KHAN, Institute of Space Technology, Islamabad						
1400 hrs AIAA-2020-0267 **Preliminary design and performance analysis of a box-wing transport aircraft** V. Cipolla, K. Abu Salem, M. Picchi Scardaoni, University of Pisa, Pisa, Italy; V. Binante, SkyBox Engineering Srl, Pisa, Italy	1430 hrs AIAA-2020-0268 **The NASA DC-8 Airborne Science Platform Beyond 2030** T. Ozoroski, J. Fenbert, Analytical Mechanics Associates, Inc., Hampton, VA; N. Borer, NASA Langley Research Center, Hampton, VA	1500 hrs AIAA-2020-0269 **Robust Conceptual Design of Transonic Airfoils** E. Olson, NASA Langley Research Center, Hampton, VA	1530 hrs AIAA-2020-0270 **Optimal Design of an N+1 Narrow-Body Transport Aircraft** H. Halversen, R. Mitchell, M. Spear, B. Vo, T. Takahashi, Arizona State University, Tempe, AZ			

Monday, 6 January 2020

75-ACD-5	Structural Design, Analysis, and Optimization					Bayhill 19
Chaired by: R. BARRETT-GONZALEZ, The University of Kansas						
1400 hrs AIAA-2020-0271 **Actuator concepts for active gust alleviation on transport aircraft at transonic speeds** L. Klug, R. Radespiel, Technical University of Braunschweig, Braunschweig, Germany; J. Ullah, F. Seel, T. Lutz, University of Stuttgart, Stuttgart, Germany; J. Wild, German Aerospace Center (DLR), Braunschweig, Germany; et al.	1430 hrs AIAA-2020-0272 **An Efficient Method to Dimensionally Reduce Aperiodic Inhomogeneous 3-D Structures to 1-D Beam-Like Structures** D. Sarojini, M. Gupta, D. Hodges, D. Mavris, Georgia Institute of Technology, Atlanta, GA	1500 hrs AIAA-2020-0273 **Adjoint-Based Structural Optimization for Beam-Like Structures Subjected to Dynamic Loads** D. Sarojini, D. Rajaram, D. Solano, D. Mavris, Georgia Institute of Technology, Atlanta, GA	1530 hrs AIAA-2020-0274 **Structural Sizing of Unconventional Aircraft under Static and Dynamic Aeroelastic Loading** D. Solano, D. Sarojini, J. Corman, D. Mavris, Georgia Institute of Technology, Atlanta, GA	1600 hrs AIAA-2020-0275 **Constructal approach to design of wing cross-section for better flow of stresses** E. Izadpanahi, M. Moshtaghzadeh, H. Radnezhad, P. Mardanpour, Florida International University, Miami, FL		

Monday, 6 January 2020

76-ACD-6/APA-6	Aerodynamic Tools, Methods, and Analyses for Aircraft Applications					Florida Ballroom C
Chaired by: D. LEVY, Sierra Nevada Corporation and C. BIL, RMIT University						
1400 hrs AIAA-2020-0276 **When Higher Fidelity Models Degrade Our Understanding of Induced Drag - The Tragedy of the Trefftz Plane Integral** T. Takahashi, C. Ou, Arizona State University, Tempe, AZ	1430 hrs AIAA-2020-0277 **Minimization of Induced and Parasitic Drag on Variable-Camber Morphing Wings** A. Stewart, D. Hunsaker, Utah State University, Logan, UT	1500 hrs AIAA-2020-0278 **The Effects of Leading Edge Flap and Trailing Edge Flaperon Deflections on Horizontal Tail Optimization** F. Gomec, E. Unver, M. Arisoy, Turkish Armed Forces Foundation, Ankara, Turkey	1530 hrs AIAA-2020-0279 **Lifting-Line Analysis of Optimum Aileron Sizing to Minimize Induced Drag During Roll** J. Brincklow, D. Hunsaker, Utah State University, Logan, UT	1600 hrs AIAA-2020-0280 **Development of an Automated Tool for Airfoil Selection (ATAS) during Aircraft Conceptual Design** A. Kamal, Military Technical College, Cairo, Egypt; A. Ramirez-Serrano, University of Calgary, Calgary, Canada	1630 hrs AIAA-2020-0281 **Bluntness Effects on the Lift to Drag Ratio of Slender Bodies in Hypersonic Flight** P. Sforza, University of Florida, Gainesville, Gainesville, FL	

Monday, 6 January 2020

77-AFM-3	Aircraft Flight Dynamics					Bayhill 17
Chaired by: M. COTTING, US Air Force Test Pilot School and A. DA RONCH, University of Southampton						
1400 hrs AIAA-2020-0282 **A New Handling Qualities Criterion for Pilot-Augmented Oscillations** D. Drewiacki, Technological Institute of Aeronautics (ITA), São José dos Campos, Brazil; F. José Silvestre, Technical University of Berlin, Berlin, Germany; A. Guimarães, Technological Institute of Aeronautics (ITA), São José dos Campos, Brazil	1430 hrs AIAA-2020-0283 **Flight loads assessment of failure cases with pilot models** M. Lone, A. Pontillo, Cranfield University, Cranfield, United Kingdom	1500 hrs AIAA-2020-0284 **Closer look at the flight dynamics of wings with non-elliptic lift distributions** E. Bragado Aldana, M. Lone, Cranfield University, Cranfield, United Kingdom	1530 hrs AIAA-2020-0285 **Performance Evaluation at Asymmetric Attitude Flight for Two Aircraft Models** M. Muqeeth, A. Abdallah, King Fahd University of Petroleum and Minerals, Dhahran, Saudi Arabia	1600 hrs AIAA-2020-0286 **Determination of Control Inputs of a Fixed-Wing Aircraft for a Given Spatial Trajectory** Z. Öznalbant, A. Chakravarthy, A. Dogan, University of Texas, Arlington, Arlington, TX		

Monday, 6 January 2020						
78-AFM-4	**Flight Test and System Identification I**					**Bayhill 18**
Chaired by: J. GRAUER, NASA Langley Research Center and C. MONTALVO, University of South Alabama						
1400 hrs AIAA-2020-0287 **Aircraft System Identification from Multisine Inputs and Frequency Responses** J. Grauer, NASA Langley Research Center, Hampton, VA; M. Boucher, NASA Armstrong Flight Research Center, Edwards, CA	1430 hrs AIAA-2020-0288 **Aerodynamic Parameter Estimation Using Reconstructed Turbulence Measurements** J. Grauer, NASA Langley Research Center, Hampton, VA	1500 hrs AIAA-2020-0289 **System Identification of the ICE/SACCON UAS Aircraft** G. Smith, B. Bixler, J. Babcock, R. Osteroos, T. McLaughlin, U.S. Air Force Academy, Colorado Springs, CO; M. Tischler, Army Combat Capabilities Development Command Aviation & Missile Center, Moffett Field, CA	1530 hrs AIAA-2020-0290 **Robust optimal input design for flight vehicle system identification** S. Hosseini, N. Botkin, J. Diepolder, F. Holzapfel, Technical University of Munich, Munich, Germany			

Monday, 6 January 2020						
79-AMT-2	**Pressure Sensitive Paint I**					**Bayhill 23**
Chaired by: C. KLEIN, DLR - German Aerospace Center and H. NAGAI, Tohoku University						
1400 hrs AIAA-2020-0291 **Differential Pressure-Sensitive Paint Method** T. Hayashi, University of Notre Dame, Notre Dame, IN; S. Hase, Mitsubishi Corporation, Nagoya, Japan; H. Sakaue, University of Notre Dame, Notre Dame, IN	1430 hrs AIAA-2020-0292 **Development of Unsteady-PSP Data Processing and Analysis Tools for the NASA Ames Unitary 11ft Wind Tunnel** J. Powell, NASA Johnson Space Center, Houston, TX; S. Murman, C. Ngo, N. Roozeboom, D. Murakami, J. Baerny, NASA Ames Research Center, Moffett Field, CA; et al.	1500 hrs AIAA-2020-0293 **Parametric investigations for frequency-domain lifetime PSP technique (FLIM)** H. Sato, Tohoku University, Sendai, Japan; D. Yorita, M. Hilfer, U. Henne, C. Klein, German Aerospace Center (DLR), Göttingen, Germany; Y. Saito, Tohoku University, Sendai, Japan; et al.	1530 hrs AIAA-2020-0294 **Measurement of Boundary Layer Transition on Oscillating Airfoil using cntTSP in Low-Speed Wind Tunnel** T. Ikami, K. Fujita, H. Nagai, Tohoku University, Sendai, Japan; D. Yorita, German Aerospace Center (DLR), Göttingen, Germany	1600 hrs AIAA-2020-0295 **Skin friction measurement on NASA Common Research Model using oil film in JAXA** H. Iijima, T. Uchiyama, H. Kato, Japan Aerospace Exploration Agency (JAXA), Chofu, Japan	1630 hrs AIAA-2020-0296 **Transition Detection Methods in a Pitch-sweep Test by means of TSP using Lifetime and Intensity Measurements** D. Yorita, J. Lemarechal, C. Klein, German Aerospace Center (DLR), Göttingen, Germany; K. Fujita, H. Nagai, Tohoku University, Sendai, Japan	

Monday, 6 January 2020						
80-AMT-3	**Spectroscopic Techniques I**					**Bayhill 21**
Chaired by: R. SPEARRIN, University of California Los Angeles and C. WINTERS, Sandia National Laboratories						
1400 hrs AIAA-2020-0297 **100-kHz Interferometric Rayleigh Scattering Flow Diagnostics at 266 nm** A. Cutler, George Washington University, Washington, D.C.; N. Jiang, S. Roy, Spectral Energies, LLC, Dayton, OH; P. Danehy, NASA Langley Research Center, Hampton, VA	1430 hrs AIAA-2020-0298 **Laser absorption of carbon dioxide at the vibrational bandhead near 4.2μm in high-pressure rocket combustion environments** D. Lee, F. Bendana, A. Nair, R. Spearrin, University of California, Los Angeles, Los Angeles, CA; S. Danczyk, W. Hargus, U.S. Air Force Research Laboratory, Edwards, CA	1500 hrs AIAA-2020-0299 **Validation and Data Processing of a Fixed Wavelength Absorption Spectroscopy System for High-Data-Rate Combustion Measurements** J. Middlebrooks, University of Missouri, Columbia, Columbia, MO; L. Thomas, Air Force Institute of Technology, Wright-Patterson AFB, OH	1530 hrs AIAA-2020-0300 **Progress in Interferometric Rayleigh Scattering to Measure Fluctuations Spectra of Velocity and Temperature in High Speed Flows** J. Panda, NASA Ames Research Center, Moffett Field, CA; M. Nguyen, Aerospace Computing, Inc, Moffett Field, CA	1600 hrs AIAA-2020-0301 **Wavelength-Modulation-Spectroscopy Diagnostics for Characterizing Metallized and Halogenated Fireballs of Energetic Materials** G. Mathews, C. Goldenstein, Purdue University, West Lafayette, IN		

Monday, 6 January 2020						
81-APA-7	**Co-Axial and Multi-Rotor Aerodynamics**					**Florida Ballroom B**
Chaired by: E. FABIANO, Boom Supersonic and T. WONG, US Army, Aviation & Missile Center						
1400 hrs AIAA-2020-0302 **Computational Study of NASA's Quadrotor Urban Air Taxi Concept** P. Ventura Diaz, S. Yoon, NASA Ames Research Center, Moffett Field, CA	1430 hrs AIAA-2020-0303 **High Fidelity Aerodynamic Force Estimation for Multirotor Crafts in Free Flight** M. Veismann, M. Gharib, California Institute of Technology, Pasadena, CA	1500 hrs AIAA-2020-0304 **CFD/CSD Study of Interactional Aerodynamics of a Coaxial Compound Helicopter in High-Speed Forward Flight** V. Klimchenko, J. Baeder, University of Maryland, College Park, College Park, MD	1530 hrs AIAA-2020-0305 **Preliminary study of the near wake vortex interactions of a coaxial rotor in hover** L. Silwal, V. Raghav, Auburn University, Auburn, AL	1600 hrs AIAA-2020-0306 **Numerical Investigation of Aerodynamic Interference on Coaxial Rotor** K. Hayami, H. Sugawara, Tokyo University of Agriculture and Technology, Koganei, Japan; Y. Tanabe, Japan Aerospace Exploration Agency (JAXA), Chofu, Japan; M. Kameda, Tokyo University of Agriculture and Technology, Koganei, Japan		

Monday, 6 January 2020						
82-APA-8	**Special Sessions in Honor of Antony Jameson's 85th Birthday I**					**Barrel Spring II**
Chaired by: S. NADARAJAH, McGill University and F. LIU, University of California, Irvine						
1400 hrs Oral Presentation **Algorithmic Contributions to CFD Grand Challenge Problems (Invited)** D. Mavriplis, University of Wyoming, Laramie, Laramie, WY	1430 hrs Oral Presentation **Enabling efficient high-order discretizations through hybridization and adaptation (Invited)** K. Fidkowski, University of Michigan, Ann Arbor, Ann Arbor, MI	1500 hrs Oral Presentation **Transonic Test Cases for Aerodynamic Shape Optimization (Invited)** J. Vassberg, The Boeing Company, Long Beach, CA	1530 hrs Oral Presentation **Discrete Adjoint Formulations for Multi-disciplinary Problems Using Automatic Differentiation (Invited)** J. Alonso, Stanford University, Stanford, CA	1600 hrs Oral Presentation **The Adjoint Method in Multidisciplinary Design Optimization (Invited)** J. Martins, University of Michigan, Ann Arbor, Ann Arbor, MI		

Monday, 6 January 2020						
83-APA-9	**Special Session: Engineered Surfaces, Materials, and Coatings for Viscous Drag Reduction**					**Coral Spring I**
Chaired by: D. HOPE and G. DALE, U.S. Air Force Research Laboratory						
1400 hrs AIAA-2020-0307 **Numerical investigation of optimal riblet size for turbine center frame strut flow and the impact on the performance** P. Leitl, bionic surface technologies GmbH, Graz, Austria; E. Göttlich, Graz University of Technology, Graz, Austria; A. Flanschger, bionic surface technologies GmbH, Graz, Austria; A. Peters, General Electric Company, Munich, Germany; C. Feichtinger, bionic surface technologies GmbH, Graz, Austria; A. Marn, Graz University of Technology, Graz, Austria; et al.	1430 hrs AIAA-2020-0308 **Riblet Surfaces for Improvement of Efficiency of Wind Turbines** P. Leitl, bionic surface technologies GmbH, Graz, Austria; V. Stenzel, Fraunhofer, Bremen, Germany; A. Flanschger, bionic surface technologies GmbH, Graz, Austria; H. Kordy, Fraunhofer, Bremen, Germany; C. Feichtinger, bionic surface technologies GmbH, Graz, Austria; Y. Kowalik, Fraunhofer, Bremen, Germany; et al.	1500 hrs AIAA-2020-0309 **Viscous Drag on Smooth and Riblet Surfaces** N. Husen, J. Naughton, University of Wyoming, Laramie, Laramie, WY; G. Dale, Air Force Research Laboratory, Wright-Patterson AFB, OH	1530 hrs AIAA-2020-0310 **Direct Contactless Microfabrication of 2D and 3D Riblet Geometries for Drag Reduction** H. Bilinsky, MicroTau Pty., Ltd., Sydney, Australia	1600 hrs AIAA-2020-0311 **Design and Testing of 3-D Riblets** P. McClure, B. Smith, W. Baker, Lockheed Martin Corporation, Bethesda, MD	1630 hrs AIAA-2020-0312 **Practical Viscous Drag Reduction: Unfinished Business from Phase IIA of ESMC** W. Felder, Stevens Institute of Technology, Hoboken, NJ; G. Dale, Air Force Research Laboratory, Wright-Patterson AFB, OH	

Monday, 6 January 2020						
84-APA-10/FD-9/SD-2/AMT-4	**Experimental-Computational High-Speed FSI I**					**Florida Ballroom A**
Chaired by: K. CASPER, Sandia National Laboratories and N. RATNAYAKE, NASA Langley Research Center						
1400 hrs AIAA-2020-0313 **Modeling, Simulation and Validation of Supersonic Parachute Inflation Dynamics during Mars Landing** D. Huang, P. Avery, C. Farhat, Stanford University, Stanford, CA; J. Rabinovitch, A. Derkevorkian, L. Peterson, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA	1430 hrs AIAA-2020-0314 **Response of a 3D flexible panel to shock impingement with control of cavity pressure** M. Gramola, P. Bruce, M. Santer, Imperial College London, London, United Kingdom	1500 hrs AIAA-2020-0315 **Simultaneous pressure and displacement measurements on a 3D flexible surface in a supersonic flow** R. Ravichandran, M. Gramola, P. Bruce, Imperial College London, London, United Kingdom	1530 hrs AIAA-2020-0316 **Shock Wave Investigation of High Speed Asperity Collision with Finite Element Modeling** A. DeLeon, A. Palazotto, Air Force Institute of Technology, Wright-Patterson AFB, OH			

Monday, 6 January 2020						
85-CPS-1	**Computing Systems**					**Celebration 11**
Chaired by: R. TUGGLE, PeopleTec						
1400 hrs AIAA-2020-0317 **Sparse Linear Algebra Toolkit for Computational Aerodynamics** S. Wood, K. Jacobson, W. Jones, W. Anderson, NASA Langley Research Center, Hampton, VA	1430 hrs AIAA-2020-0318 **An Avionics Cyber Intrusion Detection System** L. Ryon, G. Rice, J. Potts, Collins Aerospace, Cedar Rapids, IA	1500 hrs AIAA-2020-0319 **Design and Prototyping of an Aviation Big Data Repository** R. Thota, G. Bawa, R. Stansbury, Embry-Riddle Aeronautical University, Daytona Beach, FL				

Monday, 6 January 2020

86-DE-2 — **Topics in Design Engineering - Design Tools and Processes I** — **Celebration 4**

Chaired by: J. CUTSHALL, Southwest Research Institute and L. SAAM, ATA Engineering, Inc. (HQ)

1400 hrs	1430 hrs	1500 hrs	1530 hrs	1600 hrs	1630 hrs
AIAA-2020-0320	AIAA-2020-0321	AIAA-2020-0322	AIAA-2020-0323	AIAA-2020-0324	AIAA-2020-0325
A Set-based Approach for Coordination of Multi-level Collaborative Design Studies	**Validation of Conceptual Hypersonic Design Tool Framework Using X-15 Case Study**	**Application of a Diverging-Converging Duct to a FSAE Radiator System**	**Digital Engineering and U.S. Army Air Vehicle Technical Description Reports**	**IPCP: Immersive Parallel Coordinates Plots for Engineering Design Processes**	**Methodologies for Design, Analysis and Optimization of Unmanned Aircraft Systems - An Undergraduate Case Study**
X. Chen, A. Riaz, M. Guenov, A. Molina-Cristobal, Cranfield University, Bedford, United Kingdom	D. Gochenaur, D. Baier, A. Zakrajsek, Air Force Research Laboratory, Wright-Patterson AFB, OH	B. Thomas, R. Agarwal, Washington University in St. Louis, St. Louis, MO	M. Calvert, Army Combat Capabilities Development Command Aviation & Missile Center, Redstone Arsenal, AL	S. Tadeja, T. Kipouros, P. Kristensson, University of Cambridge, Cambridge, United Kingdom	J. Hunter, A. Khalid, Kennesaw State University, Marietta, GA

Monday, 6 January 2020

87-EDU-2 — **Advancing Aerospace Education II** — **Silver Spring I**

Chaired by: K. RAVINDRA, Saint Louis University

1400 hrs	1430 hrs	1500 hrs	1530 hrs	1600 hrs		
AIAA-2020-0326	AIAA-2020-0327	AIAA-2020-0328	AIAA-2020-0329	AIAA-2020-0330		
Teaching Aerospace Structures and Materials to the World – Analysis of the edX MOOC Introduction to Aerospace Structures and Materials	**Design and Development of a Computational Fluid Dynamics Software in the Context of a Capstone Project**	**Introducing Aerospace Design: Enhancement via differentiation and condensation, and their connection to a 'Learning Curve'**	**Deflategate: Classroom Thermophysics Investigation via Simultaneous Pressure and Temperature Measurement Inside a Football**	**Teaching Space-Borne Recycling to Middle School Students via 3D Printing – Managing Classroom Air Quality**		
G. Saunders-Smits, C. Rans, J. Teuwen, J. Sinke, R. Alderliesten, W. Van Valkenburg, Delft University of Technology, Delft, The Netherlands	V. Liguori, H. Papillon Laroche, M. Parenteau, E. Laurendeau, Polytechnique Montréal, Montréal, Canada	P. Washabaugh, University of Michigan, Ann Arbor, Ann Arbor, MI	S. Tong, S. Karackattu, Oak Hall School, Gainesville, FL; M. Traum, Engineer, Inc., Gainesville, FL	D. Wilkins, M. Traum, Engineer, Inc., Gainesville, FL; J. Wilkins-Earley, Ignite School House, Inc., Gainesville, FL		

Monday, 6 January 2020

88-EXPL-2 — **Critical Technologies for Extended Lunar Surface Operation and Exploration** — **Orlando Ballroom N**

1400 - 1700 hrs

Panelists, drawn from NASA, industry and academic leaders and researchers, will discuss topics that may include, but not be limited to: 1) Landers and transportation, 2) Surface mobility vehicles, robots & hoppers, 3) Human support/health - Habitats and EVA, 4) Reduced gravity challenges, 5) Power and ISRU (nuclear & solar power, energy transmission, water extraction, power generation), 6) Surface infrastructure, such as habitats, additive manufacturing, thermal/radiation/dust shelters, berms, landing pads. Management topics, such as partnerships, policies, outreach and international cooperation, will also be discussed.

Panelists:

John Mankins	**Jerry Sanders**	**Bertrand Baratte**	**Doug Craig**	**Jim Schier**
Space Power Utilities Artemis Innovations	ISRU NASA Johnson Space Center	Cryogenic Fluid Management Air Liquide	Habitation Systems and Lunar Exploration Architecture NASA Headquarters	Lunar Communications Architecture NASA Headquarters

Monday, 6 January 2020

89-F360-2 — **Forum 360: Aerospace Innovation Enables Resilient Communities** — **Regency Ballroom Q**

1400 - 1600 hrs

Moderator: Allie Braun, Communications, Earthrise Alliance

Panelists:

Gijs de Boer	**Mark Mozena**	**John Murray**	**Rhiannan Price**
Research Scientist III, Cooperative Institute for Research in Environmental Sciences University of Colorado and NOAA Physical Sciences Division	Senior Director, Government Affairs Planet	Associate Program Manager, NASA Earth Science Disasters Program NASA Langley Research Center	Director, Sustainable Development Practice Maxar Technologies

Monday, 6 January 2020						
90-FD-10/HSABP-2	**LES and RANS/LES Methods for High Speed Flows**					**Plaza Ballroom K**
Chaired by: J. EDWARDS and P. SUBBAREDDY, North Carolina State University						
1400 hrs Oral Presentation **Coarse-grid simulations of hypersonic boundary layer transition: Is it even possible (Invited)** S. Frankel, Technion–Israel Institute of Technology, Tel Aviv, Israel	1430 hrs Oral Presentation **Hybrid Reynolds-Averaged / Large Eddy Simulations for the NASA Enhanced Injection and Mixing Project (Invited)** R. Baurle, T. Drozda, NASA Langley Research Center, Hampton, VA	1500 hrs Oral Presentation **Wall-modeled LES for high speed flow (Invited)** P. Subbareddy, B. Mettu, North Carolina State University, Raleigh, NC	1530 hrs AIAA-2020-0331 **The Complexity of LES of High-Speed Reactive Flows for Combustor Applications (Invited)** C. Fureby, Swedish Defense Research Agency (FOI), Stockholm, Sweden	1600 hrs Oral Presentation **A comparative study of inflow turbulent-boundary-layer generation methods for hypersonic flows (Invited)** L. Duan, Missouri University of Science and Technology, Rolla, MO		

Monday, 6 January 2020						
91-FD-11	**Low-Frequency Unsteadiness in Turbulent Shock-Wave/Boundary-Layer Interactions**					**Orlando Ballroom M**
Chaired by: J. POGGIE, Purdue University- Sch of Aero and Astro and P. MARTIN, University of Maryland						
1400 hrs Oral Presentation **Unsteady Characteristics of 3-D Shock Boundary Layer Interactions (Invited)** F. Alvi, Florida A&M University-Florida State University, Tallahassee, FL	1430 hrs Oral Presentation **Unsteadiness of 2D and 3D Compression Ramp Shock/ Boundary Layer Interactions (Invited)** L. Vanstone, N. Clemens, University of Texas, Austin, Austin, TX	1500 hrs Oral Presentation **A Dynamical System Based Analysis of 2D and 3D Shock-Turbulent Boundary Layer Interaction Unsteadiness (Invited)** D. Gaitonde, M. Adler, Ohio State University, Columbus, OH	1530 hrs Oral Presentation **Centrifugal inviscid instability in shock separated flows at Mach 3 through 10 (Invited)** P. Martin, University of Maryland, College Park, College Park, MD	1600 hrs Oral Presentation **Selective Upstream Influence on Separation Unsteadiness (Invited)** J. Poggie, Purdue University, West Lafayette, IN		

Monday, 6 January 2020						
92-FD-12	**Bio-Inspired and Low-Reynolds Number Flows I**					**Blue Spring I**
Chaired by: C. KANG, University of Alabama in Huntsville and H. AONO, Tokyo University of Science						
1400 hrs AIAA-2020-0332 **A Study on the Aerodynamic Performance of a Morphing Wing during Pitching Motion** M. Sargunaraj, D. Adhikari, C. Soto, S. Bhattacharya, University of Central Florida, Orlando, FL	1430 hrs AIAA-2020-0333 **Unsteady Maneuvering of a Morphing Wing** K. Joshi, C. Vazquez, J. Kauffman, S. Bhattacharya, University of Central Florida, Orlando, FL	1500 hrs AIAA-2020-0334 **Unsteady Ground Effects On A Rectangular And Swept Wing Undergoing Heaving And Pitching During Deceleration** D. Adhikari, M. Sargunaraj, C. Soto, S. Bhattacharya, G. Loubimov, M. Kinzel, University of Central Florida, Orlando, FL	1530 hrs AIAA-2020-0335 **Full-scale aeroelastic simulations of hovering bat flight** V. Joshi, R. Jaiman, University of British Columbia, Vancouver, Canada; G. Li, National University of Singapore, Singapore, Singapore; K. Breuer, S. Swartz, Brown University, Providence, RI	1600 hrs AIAA-2020-0336 **Numerical simulation of acoustic scattering and flow-induced noise with sharp interface immersed boundary method** C. Zhao, Huazhong University of Science and Technology, Wuhan, China; Y. Yang, Chinese Academy of Sciences, Beijing, China; T. Zhang, Huazhong University of Science and Technology, Wuhan, China; H. Dong, University of Virginia, Charlottesville, Charlottesville, VA	1630 hrs AIAA-2020-2036 **Computational aeroelasticity of flexible membrane wings at moderate Reynolds numbers** G. Li, B. Khoo, National University of Singapore, Singapore, Singapore; R. Jaiman, University of British Columbia, Vancouver, Canada	

Monday, 6 January 2020						
93-FD-13	**CFD Methods II**					**Rainbow Spring II**
Chaired by: M. FRANCIOLINI, NASA Ames Research Center and M. GALBRAITH, Massachusetts Institute of Technology						
1400 hrs AIAA-2020-0337 **A Three Dimensional Multilevel Meshless Method : Point-Based Convergence Accelerator** J. Rhee, J. Huh, T. Kung, K. Kim, Seoul National University, Seoul, South Korea	1430 hrs AIAA-2020-0338 **Automatic adaptive remeshing for unsteady interfacial flows with surface tension** Y. Vautrin, E. Muller, D. Pelletier, S. Etienne, C. Béguin, Polytechnique Montréal, Montréal, Canada	1500 hrs AIAA-2020-0339 **Attachment Field Hole Cutting for Chimera Overset Meshes: Boundary Element and Radial Basis Function Approaches** E. Wolf, Ohio Aerospace Institute, Dayton, OH; C. Schrock, N. Wukie, Air Force Research Laboratory, Wright-Patterson AFB, OH	1530 hrs AIAA-2020-0340 **Parallel In Time for a Fully Space-Time Adaptive Mesh Refinement Algorithm** J. Christopher, X. Gao, S. Guzik, Colorado State University, Fort Collins, CO; R. Falgout, Lawrence Livermore National Laboratory, Livermore, CA; J. Schroder, University of New Mexico, Albuquerque, Albuquerque, NM	1600 hrs AIAA-2020-0341 **A Machine-Learning Anisotropy Detection Algorithm for Output-Adapted Meshes** K. Fidkowski, G. Chen, University of Michigan, Ann Arbor, Ann Arbor, MI	1630 hrs AIAA-2020-0342 **Improving resolution of three-dimensional lattice Boltzmann simulations using bicubic spline interpolation for moving boundaries** P. Ahmad, M. Yadav, Indian Institute of Technology Delhi, New Delhi, India; N. Arora, Sankhya Sutra Labs, Bengaluru, India; A. Gupta, Indian Institute of Technology Delhi, New Delhi, India	

Monday, 6 January 2020						
94-FD-14	**Uncertainty Quantification and V&V in CFD**					**Rock Spring I & II**
Chaired by: J. SCHAEFER, The Boeing Company and J. SEIDEL, USAF Academy						
1400 hrs AIAA-2020-0343 **Developing a Numerical Model of the Virginia Tech Stability Wind Tunnel for Uncertainty Quantification Based On Real-World Geometry** M. Szoke , V. Vishwanathan, T. Loeschen, A. Gargiulo, D. Fritsch, J. Duetsch-Patel, Virginia Polytechnic Institute and State University, Blacksburg, VA; et al.	1430 hrs AIAA-2020-0344 **Residual-Based Discretization Error Estimation for Unsteady Flows** T. Gautham, H. Wang, C. Roy, Virginia Polytechnic Institute and State University, Blacksburg, VA	1500 hrs AIAA-2020-0345 **Validation of CFD Simulations of Aerodynamic Performance of Low Speed Axial Fans with Low Hub-to-Tip Ratio** J. Wang, N. Kruyt, University of Twente, Enschede, The Netherlands	1530 hrs AIAA-2020-0346 **Validation Approach for CFD-Based Random Total-Pressure Data** J. Mace, Self, St. Louis, MO; W. Steenken, BVS and Associates, Hamilton, OH; C. Winkler, The Boeing Company, St. Louis, MO; J. Harvell, Rolls-Royce Group plc, Indianapolis, IN	1600 hrs AIAA-2020-0347 **Code Verification for 3D Turbulence Modeling in Parallel SENSEI Accelerated with MPI** W. Xue, H. Wang, C. Roy, Virginia Polytechnic Institute and State University, Blacksburg, VA		

Monday, 6 January 2020						
95-FD-15	**Vortex Dynamics I**					**Blue Spring II**
Chaired by: M. RINGUETTE, University at Buffalo, The State University of New York and J. BUCHHOLZ, University of Iowa						
1400 hrs AIAA-2020-0348 **Vortex Dynamics of Darrieus Turbines with Intracycle Angular Velocity Control** M. Dave, University of Wisconsin, Madison, Madison, WI; B. Strom, XFlow Energy Company, Seattle, WA; J. Franck, University of Wisconsin, Madison, Madison, WI	1430 hrs AIAA-2020-0349 **Structure of tip vortex and wake of unsteady wings** B. Turhan, Z. Wang, I. Gursul, University of Bath, Bath, United Kingdom					

Monday, 6 January 2020						
96-FD-16	**Turbulent Flows II**					**Rainbow Spring I**
Chaired by: J. LARSSON, University of Maryland and K. MATSUNO						
1400 hrs AIAA-2020-0350 **Increasing the Finite Limit of Predictability in Turbulence by Data Assimilation** C. Hurst, X. Gao, Colorado State University, Fort Collins, CO	1430 hrs AIAA-2020-0351 **Generalized Non-Linear Eddy Viscosity Models for Data-Assisted Reynolds Stress Closure** B. Parmar, E. Peters, K. Jansen, A. Doostan, J. Evans, University of Colorado, Boulder, Boulder, CO	1500 hrs AIAA-2020-0352 **CFD Modeling of Bluff-Body Stabilized Premixed Flames with Data Assimilation** Y. Wang, S. Walters, N. Overton-Katz, S. Guzik, X. Gao, Colorado State University, Fort Collins, CO	1530 hrs AIAA-2020-0353 **The evolution of turbulent wake examined using the horizontal visibility graph** H. Wu, X. Tao, University of Kansas, Lawrence, Lawrence, KS	1600 hrs AIAA-2020-0354 **Prediction Capability of RANS Turbulence Models for Asymmetrically Heated High-Aspect-Ratio Duct Flows** T. Kaller, Technical University of Munich, Garching, Germany; S. Hickel, Delft University of Technology, Delft, The Netherlands; N. Adams, Technical University of Munich, Garching, Germany		

Monday, 6 January 2020						
97-FD-17	**Multiphase Flows I**					**Plaza Ballroom F**
Chaired by: J. CAPECELATRO, University of Michigan, Ann Arbor and C. HADER						
1400 hrs AIAA-2020-0355 **Exploration of Two-Phase Flow Structures in an Aluminum Nozzle of an Aerated-Liquid Injector Using X-Ray Fluorescence Techniques** K. Lin, Taitech, Inc., Beavercreek, OH; A. Kastengren, Argonne National Laboratory, Argonne, IL; C. Carter, Air Force Research Laboratory, Wright-Patterson AFB, OH	1430 hrs AIAA-2020-0356 **A Validation Study of Hydrodynamic RAM and Fuel Spurt Using CFD Tool** H. Yang, CFD Research Corporation (CFDRC), Huntsville, AL; S. Yang, Randolph School, Huntsville, AL; P. Disimile, University of Cincinnati, Cincinnati, OH	1500 hrs AIAA-2020-0357 **Analysis of dynamics of liquid jet injected into gaseous crossflow using proper orthogonal decomposition** A. Asuri Mukundan, T. Menard, National Center for Scientific Research (CNRS), Rouen, France; M. Herrmann, Arizona State University, Tempe, AZ; J. Brandle de Motta, A. Berlemont, National Center for Scientific Research (CNRS), Rouen, France	1530 hrs AIAA-2020-0358 **Lagrangian Numerical Analysis of Liquid Jet in Subsonic Crossflow** D. Fontes, R. Forehand, M. Kinzel, University of Central Florida, Orlando, FL	1600 hrs AIAA-2020-0359 **The Structure of Impinging Liquid Jets with and without External Transverse Acoustic Forcing** K. Boaz, D. Forliti, University of St. Thomas, St. Paul, MN		

Monday, 6 January 2020						
98-FD-18	**Instability and Transition II**					**Plaza Ballroom J**
Chaired by: S. CRAIG, University of Arizona and E. WHITE, Texas A&M University						
1400 hrs AIAA-2020-0360 **Flow quality mapping of the Mach 4 Quiet Ludwieg Tube** J. Flood, S. Craig, L. Taubert, University of Arizona, Tucson, Tucson, AZ	1430 hrs AIAA-2020-0361 **First and Mack-mode instabilities in a flat-plate boundary layer at Mach 4** J. Flood, L. Taubert, S. Craig, University of Arizona, Tucson, Tucson, AZ	1500 hrs AIAA-2020-0362 **Hypersonic Slender-Cone Boundary-Layer Instability in the UMD HyperTERP Shock Tunnel** A. Hameed, N. Parziale, Stevens Institute of Technology, Hoboken, NJ; L. Paquin, C. Butler, S. Laurence, University of Maryland, College Park, Silver Spring, MD				

Monday, 6 January 2020						
99-FD-19	**Machine Learning for Fluid Flows**					**Plaza Ballroom H**
Chaired by: K. TAIRA, University of California, Los Angeles and S. DAWSON, Illinois Institute of Technology						
1400 hrs AIAA-2020-0363 **Hyperreduction of CFD Models of Turbulent Flows using a Machine Learning Approach** S. Grimberg, C. Farhat, Stanford University, Stanford, CA	1430 hrs AIAA-2020-0364 **Fast Neural Network Predictions from Constrained Aerodynamics Datasets** C. White, Stanford University, Stanford, CA; D. Ushizima, Lawrence Berkeley National Laboratory, Berkeley, CA; C. Farhat, Stanford University, Stanford, CA	1500 hrs AIAA-2020-0365 **Data-Driven Reduction and Decomposition via Time-Axis Clustering** S. Barwey, V. Raman, University of Michigan, Ann Arbor, Ann Arbor, MI; A. Steinberg, Georgia Institute of Technology, Atlanta, GA				

Monday, 6 January 2020						
100-GNC-3	**Entry, Descent and Landing GN&C Technology I (Invited)**					**Bayhill 31**
Chaired by: J. CARSON, NASA and K. DEMARS, Texas A&M University						
1400 hrs AIAA-2020-0366 **Navigation Sensor Evaluation for Precision Lander Missions** A. Dwyer-Cianciolo, NASA Langley Research Center, Hampton, VA; R. Sostaric, NASA Johnson Space Center, Houston, TX; R. Lugo, NASA Langley Research Center, Hampton, VA; D. Woffinden, NASA Johnson Space Center, Houston, TX; C. Karlgaard, Analytical Mechanics Associates, Inc., Hampton, VA; P. Chen, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA	1430 hrs AIAA-2020-0367 **Hardware-in-the-Loop Testing for Suborbital Flights of the Safe and Precise Landing Integrated Capabilities Evolution (SPLICE) Project Technologies** D. Rutishauser, T. Tse, NASA Johnson Space Center, Houston, TX	1500 hrs AIAA-2020-0368 **Next-Generation NASA Hazard Detection System Development** C. Restrepo, NASA Goddard Space Flight Center, Greenbelt, MD; R. Sostaric, NASA Johnson Space Center, Houston, TX	1530 hrs AIAA-2020-0369 **Navigation Doppler Lidar performance analysis at high speed and long range** A. Gragossian, D. Pierrottet, Coherent Applications, Inc., Hampton, VA; J. Estes, NASA Johnson Space Center, Houston, TX; B. Barnes, F. Amzajerdian, G. Hines, NASA Langley Research Center, Hampton, VA	1600 hrs AIAA-2020-0370 **Operational Constraint Analysis of Terrain Relative Navigation for Landing Applications** K. Smith, A. Olguin, M. Fritz, Draper Laboratory, Cambridge, MA; R. Lovelace, R. Sostaric, S. Pedrotty, NASA Johnson Space Center, Houston, TX; et al.	1630 hrs AIAA-2020-0371 **Development of a Lunar Lander Simulator: Commemorating Apollo and Looking to the Future** K. Duda, R. de Saint Phalle, C. Schroeder, M. Johnson, T. Fill, B. Miller, Draper Laboratory, Cambridge, MA; et al.	

Monday, 6 January 2020						
101-GNC-4	**Aircraft Trajectory Generation and Flight Envelope Visualization**					**Bayhill 33**
Chaired by: A. MENON, Wichita State University and M. RAFI, Wichita State University						
1400 hrs AIAA-2020-0372 **Spline Trajectory Planning and Guidance for Fixed-Wing Drones** J. Stephan, S. Notter, O. Pfeifle, F. Pinchetti, W. Fichter, University of Stuttgart, Stuttgart, Germany	1430 hrs AIAA-2020-0373 **Supplementing Haptic Feedback Through the Visual Display of Flight Envelope Boundaries** G. de Rooij, D. Van Baelen, C. Borst, M. van Paassen, M. Mulder, Delft University of Technology, Delft, The Netherlands	1500 hrs AIAA-2020-0374 **Flatness-based aircraft trajectory optimization and tracking using pseudospectral method** S. R, R. Mohan, Indian Institute of Technology Madras, Chennai, India				

Monday, 6 January 2020

102-GNC-5	Control and Autonomy I					Bayhill 32
Chaired by: J. CHEN, San Diego State University and L. POLLINI, University of Pisa						
1400 hrs AIAA-2020-0375 **Markov Neural Network For Guidance, Navigation and Control** S. Lim, M. Stoeckle, B. Streetman, M. Neave, Draper Laboratory, Cambridge, MA	1430 hrs AIAA-2020-0376 **Comparison of Derivative Estimation Methods in Solving Optimal Control Problems Using Direct Collocation** Y. Agamawi, A. Rao, University of Florida, Gainesville, Gainesville, FL	1500 hrs AIAA-2020-0377 **A Proximal Method for the Numerical Solution of Singular Optimal Control Problems Using a Modified Radau Collocation Method** E. Pager, A. Rao, University of Florida, Gainesville, Gainesville, FL	1530 hrs AIAA-2020-0378 **Mesh Refinement Method for Solving Bang-Bang Optimal Control Problems Using Direct Collocation** Y. Agamawi, W. Hager, A. Rao, University of Florida, Gainesville, Gainesville, FL	1600 hrs AIAA-2020-0379 **Tail Reoptimization in Desensitized Optimal Control** K. Seywald, KBR, Inc., Mountain View, CA; H. Seywald, Self, Yorktown, VA		

Monday, 6 January 2020

103-GT-2	Modeling and Simulation of Wind Tunnel Experiments					Bayhill 24
Chaired by: E. HUBBARD, NASA Glenn Research Center and D. MYREN, AERO Systems Engineering, Inc.						
1400 hrs AIAA-2020-0380 **CFD Concepts for In-Tunnel Simulation of Low Speed Wind Tunnels with Closed Test Section** R. Rudnik, S. Melber-Wilkending, German Aerospace Center (DLR), Braunschweig, Germany	1430 hrs AIAA-2020-0381 **Homogeneous Condensation of Nitrogen in Hypersonic Wind Tunnels: A Semi-Empirical Model** P. Lax, S. Leonov, University of Notre Dame, Notre Dame, IN	1500 hrs AIAA-2020-0382 **Investigation of a Free-Stream Air Plasma Flow by Optical Emission Spectroscopy and Comparison to Magnetohydrodynamics Simulations** A. Fagnani, D. Le Quang Huy, B. Helber, S. Demange, A. Turchi, O. Chazot, von Kármán Institute for Fluid Dynamics, Rhode-Saint-Genèse, Belgium; et al.				

Monday, 6 January 2020

104-GTE-3	Compressors and Fans II					Barrel Spring I
Chaired by: M. ATTIA, Embry-Riddle Aeronautical University and N. JOSHI, GE						
1400 hrs AIAA-2020-0383 **An experimental and computational study of a tuned damper with frictional contact for rotor blade-like structures** A. Lupini, J. Shim, B. Epureanu, University of Michigan, Ann Arbor, Ann Arbor, MI	1430 hrs AIAA-2020-0384 **Numerical investigation of Non-Synchronous Vibration with Fluid-Structure Interaction using Delayed Detached Eddy Simulation** P. Patel, University of Miami, Coral Gables, FL; H. Im, Doosan Corporation, West Palm Beach, FL; G. Zha, University of Miami, Coral Gables, FL	1500 hrs AIAA-2020-0385 **Application of Non-Linear Harmonic and Time Marching techniques to analyze aerodynamics of inlet distortion in a Tail-Cone Thruster Fan stage** R. Giri, M. Turner, University of Cincinnati, Cincinnati, OH; M. Celestina, NASA Glenn Research Center, Cleveland, OH				

Monday, 6 January 2020

105-GTE-4 1400 - 1600 hrs	Industry-University Collaboration for Gas Turbine Technology Development	Manatee Spring II

The format will be 10-15 minutes presentation by each panelist followed by Q&A. The topics of discussion will be research and education broadly in the area of gas turbines and propulsion. The objective is to discuss perspectives, opinions, and experiences from both sides (industry and university) to prepare for the future needs. What currently works? What does not? What is lacking? How to address the gaps? For example, industry could benefit if university research programs and curricula are better aligned to create a readily employable workforce. Similarly, universities have an obligation to make sure that students are prepared to survive in a rapidly changing world.

Moderators: Keith McManus, General Electric and Subith Vasu, University of Central Florida

Panelists:

Tim Lieuwen
Georgia Institute of Technology

Jay Kapat
CATER
University of Central Florida

Scott Claflin
Power Innovations
Aerojet Rocketdyne

Alton (Al) D. Romig, Jr.
Executive Officer
NAE

Monday, 6 January 2020

106-ICC-1	Information and Command and Control Systems					Celebration 8
Chaired by: J. MCEVER, The Johns Hopkins University Applied Physics Laboratory and A. RAZ, Purdue University and M. SOTAK, Kratos Defense						
1400 hrs AIAA-2020-0386 **Spacecraft Command and Control with Safety Guarantees using Shielded Deep Reinforcement Learning** A. Harris, H. Schaub, University of Colorado, Boulder, Boulder, CO	1430 hrs AIAA-2020-0387 **Common Multi Domain Target Nominator Multi-Domain Command and Control for Integrating Space, Air, Ground, and Cyber Systems** J. Taylor, SURVICE Engineering, Fort Walton Beach, FL	1500 hrs AIAA-2020-0388 **Weapon Target Assignment Problem with Interference Constraints** D. Lee, M. Shin, H. Choi, Korea Advanced Institute of Science and Technology, Deajeon, South Korea	1530 hrs AIAA-2020-0389 **Towards Automated Aircraft Maintenance Inspection. A use case of detecting aircraft dents using Mask R-CNN** S. Bouarfa, Abu Dhabi Polytechnic, Al Ain, United Arab Emirates; A. Doğru, Özyegin University, Istanbul, Turkey; R. Arizar, Singulair Solutions B.V., Rotterdam, The Netherlands; R. Aydoğan, Özyegin University, Istanbul, Turkey; J. Serafico, Abu Dhabi Polytechnic, Al Ain, United Arab Emirates			

Monday, 6 January 2020

107-IS-2/SOF-2 1400 - 1700 hrs	Stakeholder Engagement for an Emerging Operation's Safety Management System	Celebration 9
What is necessary to achieve an In-Time Aviation Safety Management System for emerging operations? What impact does the increasing use of autonomy have on our ability to maintain overall safety in the National Airspace? In this session, we will review NASA's In-Time System-Wide Safety Assurance research thrust. We will then talk about the broader context of safety management given the increasing scale and breadth of operations in aviation's future. Please join us for a discussion on maintaining or improving safety during operations while enabling innovation, an identification of the research gaps, and suggestions for a plan that allows us to achieve a transformed National Airspace.		

Monday, 6 January 2020

108-IS-3	Autonomy - Perception, Localization, Tracking					Celebration 10
Chaired by: A. CHAKRABARTY						
1400 hrs AIAA-2020-0390 **An Experiment on Vision-Based Leader-Following for Multiagent Systems** D. Tran, S. Dang, T. Yucelen, S. Chellappan, University of South Florida, Tampa, FL	1430 hrs AIAA-2020-0391 **Auto-Tuning Online POMDPs for Multi-Object Search in Uncertain Environments** S. Wakayama, N. Ahmed, University of Colorado, Boulder, Boulder, CO	1500 hrs AIAA-2020-0392 **Neural Network Based Approaches to Mobile Target Localization and Tracking Using Unmanned Aerial Vehicles** R. Zahedi, E. Ceh-Varela, R. Selje II, H. Cao, L. Sun, New Mexico State University, Las Cruces, NM	1530 hrs AIAA-2020-0393 **Trilateration Positioning Using Hybrid Camera-LiDAR System** T. Moleski, J. Wilhelm, Ohio University, Athens, OH	1600 hrs AIAA-2020-0394 **Domain Decomposition for a Hybrid State Estimation of a Plume Field with a Moving Sensor** X. Tian, M. Demetriou, N. Gatsonis, Worcester Polytechnic Institute, Worcester, MA		

Monday, 6 January 2020

109-MAT-3/STR-3	Applications of Artificial Intelligence and Machine Learning to Problems in Structures and Materials I					Celebration 6
Chaired by: S. WANTHAL, Boeing Research & Technology and W. YU, Purdue University						
1400 hrs AIAA-2020-0395 **Self-learning Data-Driven Multiscale Microstructure Topology Design** K. Jang, S. Kim, G. Yun, Seoul National University, Seoul, South Korea	1430 hrs AIAA-2020-0396 **A neural network enhanced system for learning nonlinear constitutive relation of fiber reinforced composites** X. Liu, F. Tao, W. Yu, Purdue University, West Lafayette, IN	1500 hrs AIAA-2020-0397 **Artificial neural network modeling of anisotropic hyperelastic materials based on computational crystal structure data** S. Im, W. Kim, H. Kim, M. Cho, Seoul National University, Seoul, South Korea	1530 hrs AIAA-2020-0398 **Physics-informed artificial neural network approach for axial compression buckling analysis of thin-walled cylinder** F. Tao, X. Liu, H. Du, W. Yu, Purdue University, West Lafayette, IN			

Monday, 6 January 2020

110-MAT-4	Materials for Hypersonic Applications and Extreme Environments					Celebration 13
Chaired by: J. PINESS, Made In Space and T. DUENAS, EPIC Advanced Materials, LLC						
1400 hrs AIAA-2020-0399 **A thermodynamic meso-scale model for oxidation of ZrB2-SiC** S. Chen, I. Boyd, University of Michigan, Ann Arbor, Ann Arbor, MI	1430 hrs AIAA-2020-0400 **Synchrotron X-Ray Diffraction Study of Phase Transformation in CMAS Ingressed EB-PVD Thermal Barrier Coatings** Z. Stein, University of Central Florida, Orlando, FL; R. Naraparaju, U. Schulz, German Aerospace Center (DLR), Cologne, Germany; P. Kenesei, J. Park, J. Almer, Argonne National Laboratory, Argonne, IL; et al.	1500 hrs AIAA-2020-0401 **Evaluation of Formulations for Self-Healing Thermal Protection System Applications** N. Skolnik, Z. Putnam, University of Illinois, Urbana-Champaign, Urbana, IL	1530 hrs AIAA-2020-0402 **Hierarchical Coupling of Molecular Dynamics and Micromechanics to Predict the Elastic Properties of Three-Phase and Four-Phase Silicon Carbide Composites** O. Aluko, University of Michigan, Flint, Flint, MI; E. Pineda, T. Ricks, S. Arnold, NASA Glenn Research Center, Cleveland, OH			

Monday, 6 January 2020

111-MDO-3/SD-3	MDO/SA with Aeroelasticity/FSI I					Celebration 2
Chaired by: M. BHATIA, Mississippi State University and B. STANFORD, NASA Langley Research Center						
1400 hrs AIAA-2020-0403 **Flutter Analysis with Stabilized Finite Elements based on the Linearized Frequency-domain Approach** K. Jacobson, B. Stanford, S. Wood, W. Anderson, NASA Langley Research Center, Hampton, VA	1430 hrs AIAA-2020-0404 **Efficient Modal Design Variables for Optimization of Aero-Elastic Wing** D. Poole, C. Allen, T. Rendall, University of Bristol, Bristol, United Kingdom	1500 hrs AIAA-2020-0405 **Aerodynamic Shape Optimization for Flutter/LCO based design using Coupled Adjoint** R. Prasad, S. Choi, Virginia Polytechnic Institute and State University, Blacksburg, VA	1530 hrs AIAA-2020-0406 **A Discrete Adjoint Solver for Time-Domain Fluid-Structure Interaction Problems with Large Deformations** C. Venkatesan-Crome, R. Palacios, Imperial College London, London, United Kingdom			

Monday, 6 January 2020

112-MST-3	Haptic Feedback and Alerting					Bayhill 30
Chaired by: O. HALBE and B. APONSO, NASA Ames Research Center						
1400 hrs AIAA-2020-0407 **Control Force Compensation in Ground-Based Flight Simulators** W. Chung, AMERICAN SYSTEMS Corporation, Chantilly, VA; P. Zaal, L. Terenzi, San Jose State University, San Jose, CA; E. Lewis, Metis Technology Solutions, Inc., Mountain View, CA; M. Blanken, NASA Ames Research Center, Moffett Field, CA	1430 hrs AIAA-2020-0408 **A 2-DoF Helicopter Haptic Support System based on Pilot Intent Estimation with Neural Networks** G. D'Intino, L. Pollini, University of Pisa, Pisa, Italy; H. Buelthoff, Max Planck Society, Tuebingen, Germany	1500 hrs AIAA-2020-0409 **Using Asymmetric Vibrations for Feedback on Flight Envelope Protection** D. Van Baelen, J. Ellerbroek, M. van Paassen, D. Abbink, M. Mulder, Delft University of Technology, Delft, The Netherlands	1530 hrs AIAA-2020-0410 **Active Inceptor Tactile Cue Design and Evaluation Using a Flight Simulator Environment** B. Akmenek, Turkish Aerospace, Ankara, Turkey; Z. Ünal, I. Yavrucuk, Middle East Technical University, Ankara, Turkey	1600 hrs AIAA-2020-0411 **Evaluation of Low Cost, User-Centered Alerting Devices for the Mitigation of Flight Crew Spatial Disorientation** R. Daiker, K. Ballard, K. Ellis, NASA Langley Research Center, Hampton, VA		

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113-MVCE-1 1400 - 1700 hrs	In Situ/In Transit Computational Environments for Visualization and Data Analytics	Bayhill 20

Panelists:

Steve Legensky Intelligent Light	Brad Whitlock Intelligent Light	David Rogers Los Alamos National Laboratory	Andy Bauer Army ERDC/Army ADD	Andy Wissink Army ERDC/Army ADD	Scott Imlay Tecplot	David Thompson Kitware	Seiji Tsutsumi Japan Aerospace Exploration Agency

Monday, 6 January 2020						
114-NDA-2/MDO-4	**Reliability-Based Design Optimization**					**Celebration 3**
Chaired by: B. BICHON, Southwest Research Institute and A. CHAUDHURI, Massachusetts Institute of Technology						
1400 hrs AIAA-2020-0412 **Gaussian Surrogate Dimension Reduction for Efficient Reliability-Based Design Optimization** D. Clark, Air Force Research Laboratory, Wright-Patterson AFB, OH; H. Bae, Wright State University, Dayton, OH; E. Forster, Air Force Research Laboratory, Wright-Patterson AFB, OH	1430 hrs AIAA-2020-0413 **Reliability-based Co-Design of State-Constrained Stochastic Dynamical Systems** T. Cui, J. Allison, P. Wang, University of Illinois, Urbana-Champaign, Urbana, IL	1500 hrs AIAA-2020-0414 **When are Design Allowables Conservative?** Z. del Rosario, Stanford University, Stanford, CA; R. Fenrich, Arevo, Milpitas, CA; G. Iaccarino, Stanford University, Stanford, CA	1530 hrs AIAA-2020-0415 **Risk Allocation for Design Optimization with Unidentified Statistical Distributions** C. Jekel, R. Haftka, University of Florida, Gainesville, Gainesville, FL			

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115-NDA-3	**Reduced-Order Modeling**					**Celebration 12**
Chaired by: E. FORSTER, AFRL - Air Force Research Laboratory(AFRL/RQ) and S. GHOSH, GE Global Research Center						
1400 hrs AIAA-2020-0416 **Reduced Order Model of Laminar Premixed Inverted Conical Flames** L. da Costa Ramos, ANSYS, Inc., Villeurbanne, France; F. Di Meglio, Paris Institute of Technology, Paris, France; L. Da Silva, Pontifical Catholic University of Rio de Janeiro, Rio de Janeiro, Brazil; V. Morgenthaler, ANSYS, Inc., Villeurbanne, France	1430 hrs AIAA-2020-0417 **Non-Intrusive Parametric Reduced Order Modeling using Randomized Algorithms** D. Rajaram, T. Puranik, C. Perron, D. Mavris, Georgia Institute of Technology, Atlanta, GA	1500 hrs AIAA-2020-0418 **Toward predictive digital twins via component-based reduced-order models and interpretable machine learning** M. Kapteyn, Massachusetts Institute of Technology, Cambridge, MA; K. Willcox, University of Texas, Austin, Austin, TX; D. Knezevic, Akselos, Inc., Cambridge, MA	1530 hrs AIAA-2020-0419 **Adaptive Sampling and Classification Decision Boundary Optimization for Mode Shape Emulation** I. Boyd, H. Bae, Wright State University, Dayton, OH; J. Brown, Air Force Research Laboratory, Wright-Patterson AFB, OH	1600 hrs AIAA-2020-0420 **Towards an integrated and efficient framework for leveraging reduced order models for multifidelity uncertainty quantification** P. Blonigan, Sandia National Laboratories, Livermore, CA; G. Geraci, Sandia National Laboratories, Albuquerque, NM; F. Rizzi, Sandia National Laboratories, Livermore, CA; M. Eldred, Sandia National Laboratories, Albuquerque, NM		

Monday, 6 January 2020						
116-PC-4	**Rocket Combustion I**					**Bayhill 22**
Chaired by: S. SCHUMAKER, AFRL/RQTC and T. GALLAGHER, Innovative Scientific Solutions, Inc.						
1400 hrs Oral Presentation **Propellant and combustion factors in liquid rocket engine development (Invited)** A. Lapsa, Blue Origin, Kent, WA	1430 hrs AIAA-2020-0421 **Large Eddy Simulations of a Liquid Rocket Injector Under Multiple Operating Conditions** M. Harvazinski, Air Force Research Laboratory, Edwards AFB, CA; T. Fuller, W. Anderson, Purdue University, West Lafayette, IN; N. Arnold-Medabalimi, C. Huang, University of Michigan, Ann Arbor, Ann Arbor, MI	1500 hrs AIAA-2020-0422 **Acoustic Forcing and Sensitivity of the Hydrodynamic Instabilities and Flame Dynamics from Hydrogen/LOX Shear Coaxial Flames** M. Roa, Sierra Lobo, Inc., Edwards AFB, CA; D. Talley, Air Force Research Laboratory, Edwards AFB, CA	1530 hrs AIAA-2020-0423 **Experimental Investigation of Self-Excited Combustion Instabilities in a LOX/LNG Rocket Combustor** J. Martin, W. Armbruster, J. Hardi, D. Suslov, M. Oschwald, German Aerospace Center (DLR), Hardthausen, Germany	1600 hrs AIAA-2020-0424 **Combustion Response of Shear Coaxial Injectors to Transverse Combustion Instabilities** R. Gejji, A. Lemcherfi, R. Strelau, C. Slabaugh, W. Anderson, Purdue University, West Lafayette, IN	1630 hrs AIAA-2020-0425 **Influence of HTPB Variants on the Wettability of Ammonium Perchlorate** D. Ramirez, J. Kalman, California State University, Long Beach, CA	

Monday, 6 January 2020						
117-PC-5	**Combustion - Ignition**					**Bayhill 25**
Chaired by: W. SUN, Georgia Institute of Technology and J. GORE, Purdue University						
1400 hrs AIAA-2020-0426 **Ignition of methane and ethylene via nanosecond pulsed discharges** N. Deak, A. Bellemans, F. Bisetti, University of Texas, Austin, Austin, TX	1430 hrs AIAA-2020-0427 **Modulated Pulse Repetition Frequencies of Nanosecond-Pulsed High-Frequency Discharge Ignition** I. Dunn, University of Central Florida, Orlando, FL; R. Leiweke, UES, Inc., Wright-Patterson AFB, OH; T. Ombrello, Air Force Research Laboratory, Wright-Patterson AFB, OH; K. Ahmed, University of Central Florida, Orlando, FL	1500 hrs AIAA-2020-0428 **An Investigation on Kernel Growth Variations between Conventional Spark Discharges and Nanosecond-Pulsed High-Frequency Discharges** K. Opacich, J. Heyne, University of Dayton, Dayton, OH; T. Ombrello, Air Force Research Laboratory, Wright-Patterson AFB, OH; J. Lefkowitz, Technion–Israel Institute of Technology, Haifa, Israel; R. Leiweke, UES Incorporated, Dayton, OH; K. Busby, Universal Technology Company, Beavercreek, OH	1530 hrs AIAA-2020-0429 **Studies of multi-channel spark ignition of lean n-pentane/air mixtures in a spherical chamber** H. Zhao, T. Zhang, N. Zhao, S. Wu, G. Ma, C. Yan, Princeton University, Princeton, NJ; et al.	1600 hrs AIAA-2020-0430 **Effect of CO_2 and N_2 Dilution on Forced Ignition of Jet A/air Mixtures** K. Teope, J. Bonebrake, D. Blunck, Oregon State University, Corvallis, OR		

Monday, 6 January 2020						
118-PC-6	**Turbulent Combustion I**					**Bayhill 26**
Chaired by: R. PITZ, Vanderbilt University and C. FUGGER, Spectral Energies, LLC						
1400 hrs AIAA-2020-0431 **Numerical Simulations of a Fire Whirl Burning Gaseous Heptane** J. Chung, X. Zhang, University of Maryland, College Park, College Park, MD; E. Oran, Texas A&M University, College Station, TX; C. Kaplan, University of Maryland, College Park, College Park, MD	1430 hrs AIAA-2020-0432 **Simulations of Whirling Flames Undergoing Vortex Breakdown** X. Zhang, J. Chung, C. Kaplan, University of Maryland, College Park, College Park, MD; E. Oran, Texas A&M University, College Station, TX	1500 hrs AIAA-2020-0433 **Effects of Swirl Number and Central Rod on Flow in Lean Premixed Swirl Combustor** K. Yellugari , R. Villalva Gomez, E. Gutmark, University of Cincinnati, Cincinnati, OH	1530 hrs AIAA-2020-0434 **Identification of Canonical Flow Patterns in Turbulent Swirling Combustion** T. Yi, N. Jiang, C. Fugger, P. Hsu, J. Felver, S. Roy, Spectral Energies, LLC, Beavercreek, OH; et al.	1600 hrs AIAA-2020-0435 **Corner Vortex Structures: Spanwise Imaging of a Confined, Premixed Bluff Body Stabilized Flame** C. Fugger, Spectral Energies, LLC, Beavercreek, OH; J. Sykes, T. Gallagher, Innovative Scientific Solutions, Inc., Dayton, OH; B. Rankin, A. Caswell, Air Force Research Laboratory, Wright-Patterson AFB, OH	1630 hrs AIAA-2020-0436 **Corner Vortex Structures: Large Eddy Simulations of a Confined, Premixed Bluff Body Stabilized Flame** J. Sykes, T. Gallagher, Innovative Scientific Solutions, Inc., Dayton, OH; C. Fugger, Spectral Energies, LLC, Beavercreek, OH; A. Caswell, B. Rankin, Air Force Research Laboratory, Wright-Patterson AFB, OH	

Monday, 6 January 2020						
119-PDL-4	**Non-Equilibrium Discharges**					**Plaza Ballroom G**
Chaired by: S. MACHERET, Purdue University and A. STARIKOVSKIY, Princeton University						
1400 hrs AIAA-2020-0437 **Full ionization of nanosecond repetitively pulsed discharges at atmospheric pressure** N. Minesi, S. Stepanyan, P. Mariotto, G. Stancu, C. Laux, CentraleSupélec, Paris, France	1430 hrs AIAA-2020-0438 **Time-resolved Electron Temperature and Electron Density Measurements in Nanosecond Pulse Discharges in O_2-Ar and CO_2-Ar Mixtures** Y. Wu, Texas A&M University, College Station, TX; A. Starikovskiy, Princeton University, Princeton, NJ; B. Leonov, C. Limbach, R. Miles, Texas A&M University, College Station, TX	1500 hrs AIAA-2020-0439 **Temporally resolved measurements of gas temperature using optical emission spectroscopy enhanced with probing nanosecond plasma pulse** X. Wang, A. Shashurin, Purdue University, West Lafayette, IN	1530 hrs AIAA-2020-0440 **Nonequilibrium vibrational excitation of nitrogen in NS discharge at high overvoltage** A. Starikovskiy, Princeton University, Princeton, NJ			

Monday, 6 January 2020						
120-PGC-3	**Pressure Gain Combustion: Detonation Physics and Explorations**					**Manatee Spring I**
Chaired by: D. SCHWER, Naval Research Lab and C. BEDICK, U.S. Department of Energy National Energy Technology Laboratory						
1400 hrs AIAA-2020-0441 **Detonation Dynamics Visualization From Megahertz Imaging** C. Fugger, Spectral Energies, LLC, Beavercreek, OH; K. Cho, J. Hoke, Innovative Scientific Solutions, Inc., Dayton, OH; M. Gomez Gomez, T. Meyer, Purdue University, West Lafayette, IN; S. Schumaker, Air Force Research Laboratory, Wright-Patterson AFB, OH; et al.	1430 hrs AIAA-2020-0442 **Quantification of Pressure Gain in Turbulent Fast Flames for Deflagration-to-Detonation** H. Chin, J. Chambers, J. Sosa, K. Ahmed, University of Central Florida, Orlando, FL	1500 hrs AIAA-2020-0443 **Effects of Scale of Flame Acceleration and DDT in Obstructed Channels** V. Gamezo, Naval Research Laboratory, Washington, D.C.; C. Bachman, E. Oran, University of Maryland, College Park, College Park, MD	1530 hrs AIAA-2020-0444 **The Sonic Line of a Propagating Detonation Wave** H. Chin, J. Chambers, J. Sosa, K. Ahmed, University of Central Florida, Orlando, D.C.; A. Poludnenko, Texas A&M University, College Station, TX; V. Gamezo, Naval Research Laboratory, Washington, D.C.	1600 hrs AIAA-2020-0445 **A comparison of methane and natural gas detonation limit behaviors** J. Crane, X. Shi, H. Wang, Stanford University, Stanford, CA	1630 hrs AIAA-2020-0446 **Unconfined Fast Flames Deflagration to Detonation Transition** R. Hytovick, J. Chambers, J. Sosa, K. Ahmed, University of Central Florida, Orlando, FL	

Monday, 6 January 2020		
121-SCS-2 **1400 - 1600 hrs**	**Spacecraft Structures Technical Panel**	**Plaza Ballroom I**

Monday, 6 January 2020						
122-SD-4	**Adaptive Aeroelastic Wing Shaping Control II**					**Celebration 1**
Chaired by: N. NGUYEN, NASA-Ames Research Center and W. SU, University of Alabama, Tuscaloosa						
1400 hrs AIAA-2020-0447 **Box Wing and Induced Drag: Compressibility Effect in Subsonic and Transonic Regimes** L. Russo, R. Tognaccini, University of Naples "Federico II", Naples, Italy; L. Demasi, San Diego State University, San Diego, CA	1430 hrs AIAA-2020-0448 **Optimal Aircraft Control Surface Layouts for Maneuver and Gust Load Alleviation** B. Stanford, NASA Langley Research Center, Hampton, VA	1500 hrs AIAA-2020-0449 **Computational Architecture Based on Murakami's Zig-Zag Function for the Geometrically Nonlinear Analysis of Variable Angle Tow Laminates** E. Santarpia, L. Demasi, San Diego State University, San Diego, CA	1530 hrs AIAA-2020-0450 **Aero-structural Analysis of Corrugated Morphing Wing with Spanwise Camber Change** K. Soneda, T. Yokozeki, T. Imamura, University of Tokyo, Tokyo, Japan; N. Tsushima, Japan Aerospace Exploration Agency (JAXA), Tokyo, Japan	1600 hrs AIAA-2020-0451 **Jig Twist Optimization of Mach 0.745 Transonic Truss Braced Wing Aircraft and High-Fidelity CFD Validation** J. Xiong, J. Fugate, Stinger Ghaffarian Technologies, Inc., Moffett Field, CA; N. Nguyen, NASA Ames Research Center, Moffett Field, CA	1630 hrs AIAA-2020-0452 **A viscous extension of the UVLM is presented by relaxing the Kutta condition and obtaining the strength of the trailing-edge singularity from boundary layer theory.** A. Rezaei, University of California, Irvine, Irvine, CA; C. dos Santos, University of São Paulo, São Paulo, Brazil; H. Taha, University of California, Irvine, Irvine, CA	

Monday, 6 January 2020						
123-SE-2	**Systems Engineering II**					**Celebration 15**
Chaired by: D. DRESS, NASA Langley Research Center and J. GEBHARD						
1400 hrs AIAA-2020-0453 **A Meta Model for Systems Engineering** J. Livingston, Riverside Research, Beavercreek, OH	1430 hrs AIAA-2020-0454 **On the Migration of Risks and Liabilities for Increased Automation** T. Morris, NASA Langley Research Center, Hampton, VA	1500 hrs AIAA-2020-0455 **A System of Systems Approach for Search and Rescue Missions** L. Knöös Franzén, S. Schön, A. Papageorgiou, I. Staack, J. Ölvander, P. Krus, Linköping University, Linköping, Sweden; et al.	1530 hrs AIAA-2020-0456 **Predictably Effective Planetary Defense Against Asteroids** C. Vono, Self, Ogden, UT			

Monday, 6 January 2020

124-SFM-4	Artificial Intelligence in Space Flight Mechanics I					Bayhill 27
Chaired by: R. LINARES, Massachusetts Institute of Technology						
1400 hrs AIAA-2020-0457 **On-Orbit Relative Pose Initialization via Convolutional Neural Networks** C. Oestreich, T. Lim, R. Broussard, U.S. Naval Academy, Annapolis, MD	1430 hrs AIAA-2020-0458 **Guidance for Closed-Loop Transfers using Reinforcement Learning with Application to Libration Point Orbits** N. LaFarge, Purdue University, West Lafayette, IN; D. Miller, Massachusetts Institute of Technology, Cambridge, MA; K. Howell, Purdue University, West Lafayette, IN; R. Linares, Massachusetts Institute of Technology, Cambridge, MA	1500 hrs AIAA-2020-0459 **Learning-based Attitude Takeover Control Strategy for Noncooperative Targets with Gaussian Processes** Y. Liu, L. Yueyong, G. Ma, Y. Guo, Harbin Institute of Technology, Harbin, China	1530 hrs AIAA-2020-0460 **Exploration of Long Time-of-Flight Three-Body Transfers Using Deep Reinforcement Learning** K. Yanagida, University of Tokyo, Tokyo, Japan; N. Ozaki, Japan Aerospace Exploration Agency (JAXA), Tokyo, Japan; R. Funase, University of Tokyo, Tokyo, Japan	1600 hrs AIAA-2020-0461 **Spacecraft Stealth Through Orbit-Perturbing Maneuvers Using Reinforcement Learning** J. Reiter, D. Spencer, Pennsylvania State University, University Park, PA; R. Linares, Massachusetts Institute of Technology, Cambridge, MA	1630 hrs AIAA-2020-0462 **On-line hazard detection algorithm for precision lunar landing using semantic segmentation** R. Moghe, R. Zanetti, University of Texas, Austin, Austin, TX	

Monday, 6 January 2020

125-SFM-5	Orbital Dynamics, Perturbations, and Stability I					Bayhill 28
Chaired by: O. ABDELKHALIK, Iowa State University						
1400 hrs AIAA-2020-0463 **Orbital Mechanics of John Glenn's Mercury Atlas (MA-6): Reconstruction through a STEM Project** M. Kinstle, Self, Renton, WA	1430 hrs AIAA-2020-0464 **Extremely long-term asteroid propagation** O. Fuentes Munoz, D. Scheeres, University of Colorado, Boulder, Boulder, CO	1500 hrs AIAA-2020-0465 **Frozen Orbits under Radiation Pressure and Zonal Gravity Perturbations** S. Kikuchi, Japan Aerospace Exploration Agency (JAXA), Sagamihara, Japan; Y. Oki, Japan Aerospace Exploration Agency (JAXA), Tsukuba, Japan; Y. Tsuda, Japan Aerospace Exploration Agency (JAXA), Sagamihara, Japan	1530 hrs AIAA-2020-0466 **Genetic optimization for the orbit maintenance of libration point orbits with applications to EQUULEUS and LUMIO** D. Dei Tos, N. Baresi, Japan Aerospace Exploration Agency (JAXA), Sagamihara, Japan			

Monday, 6 January 2020

126-SFM-6	Space Trajectory Design and Optimization I					Bayhill 29
Chaired by: T. ELGOHARY, University of Central Florida						
1400 hrs AIAA-2020-0467 **On the Restricted 3-Body Problem for the Saturn-Enceladus system: mission geometry & orbit design for plume sampling missions** L. Massarweh, Elecnor Deimos, Lisbon, Portugal; P. Cappuccio, University of Rome "La Sapienza", Rome, Italy	1430 hrs AIAA-2020-0468 **Energy and inclination Analysis of the powered Swing-By maneuver in elliptical system** A. Ferreira, R. Moraes, São Paulo State University, Guaratingueta, Brazil; A. Prado, National Institute for Space Research (INPE), São José dos Campos, Brazil; O. Winter, São Paulo State University, Guaratingueta, Brazil	1500 hrs AIAA-2020-0469 **Extended Robust Planetary Orbit Insertion Method Under Probabilistic Uncertainties** N. Ozaki, Japan Aerospace Exploration Agency (JAXA), Kanagawa, Japan; T. Chikazawa, K. Kakihara, A. Ishikawa, University of Tokyo, Tokyo, Japan; Y. Kawakatsu, Japan Aerospace Exploration Agency (JAXA), Kanagawa, Japan	1530 hrs AIAA-2020-0470 **High Velocity Aero-gravity Assist Applied on Eccentricity to Inclination Conversion for Reaching Solar Polar Orbit** T. Monteiro Padovan, University of Tokyo, Bunkyo-ku, Japan; J. Kawaguchi, K. Yamada, Japan Aerospace Exploration Agency (JAXA), Sagamihara, Japan; R. Gutierrez, Graduate University for Advanced Studies, Sagamihara, Japan; Y. Kubo, University of Tokyo, Bunkyo-ku, Japan	1600 hrs AIAA-2020-0471 **Navigation Design and Operations of MAVEN Aerobraking** S. Demcak, B. Young, E. Graat, R. Beswick, K. Criddle, R. Ionasescu, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA; et al.	1630 hrs AIAA-2020-0472 **Multi-Stage Stabilized Continuation for Indirect Optimal Control of Hypersonic Trajectories** M. Vedantam, M. Akella, University of Texas, Austin, Austin, TX; M. Grant, Sandia National Laboratories, Albuquerque, NM	

Monday, 6 January 2020

127-STR-4	Characterization and Failure Prediction of Composite Structures II					Celebration 5
Chaired by: A. BERGAN, NASA Langley Research Center and A. SELVARATHINAM, Lockheed Martin Corporation						
1400 hrs AIAA-2020-0473 **Influence of Automated Fiber Placement (AFP) Manufacturing Signature on the Mechanical Performance of a Composite** M. Nguyen, P. Davidson, A. Waas, University of Michigan, Ann Arbor, Ann Arbor, MI	1430 hrs AIAA-2020-0474 **Structural Analysis of Wind Tunnel Blades for the National Transonic Facility** B. Mason, A. Lovejoy, D. Munden, NASA Langley Research Center, Hampton, VA	1500 hrs AIAA-2020-0475 **Biaxial Fatigue Damage in Quasi Isotropic Laminates** T. Skinner, Arizona State University, Tempe, AZ; S. Datta, Army Research Laboratory, Tempe, AZ; A. Chattopadhyay, Arizona State University, Tempe, AZ; A. Hall, Army Research Laboratory, Aberdeen Proving Ground, MD	1530 hrs AIAA-2020-0476 **A Numerical Study on Micromechanics of Kink Band Formation** S. Krishnappa, S. Gururaja, Indian Institute of Science, Bengaluru, India	1600 hrs AIAA-2020-0477 **A Methodology to Investigate Skin-Stringer Separation in Postbuckled Composite Stiffened Panels** L. Kootte, C. Bisagni, Delft University of Technology, Delft, The Netherlands	1630 hrs AIAA-2020-0478 **Test and Analysis Correlation of Standard and Hybrid Standard/Thin-ply Composite Notched Specimens** A. Zahn, A. Lovejoy, NASA Langley Research Center, Hampton, VA	

Monday, 6 January 2020						
128-STR-5	**Innovative Concepts in Aircraft Structures I**					**Celebration 14**
Chaired by: P. AGGARWAL, NASA Marshall Space Flight Center and L. DEMASI, San Diego State University College of Engineering						
1400 hrs AIAA-2020-0479 **Towards Feasible Near-Vacuum Lighter-than-Air Envelopes via Gossamer Structures** R. Adorno, A. Palazotto, Air Force Institute of Technology, Wright-Patterson AFB, OH	1430 hrs AIAA-2020-0480 **The Structural Suitability of Tensegrity Aircraft Wings** A. Mills, D. Myszka, University of Dayton, Dayton, OH; D. Woods, J. Joo, Air Force Research Laboratory, Wright-Patterson AFB, OH; A. Murray, University of Dayton, Dayton, OH	1500 hrs AIAA-2020-0481 **Spreading of Carbon Fiber/ Thermoplastic Pre-preg Tapes** G. Clancy, R. O'Higgins, P. Weaver, University of Limerick, Limerick, Ireland				

Monday, 6 January 2020						
129-TP-2	**Thermal Protection Systems: Modeling II**					**Plaza Ballroom E**
Chaired by: D. PYTEL, Lockheed Martin Space Systems and D. ANDRIENKO, Texas A&M University						
1400 hrs AIAA-2020-0482 **Hinge Method for Immersed Boundary Problems and Micro-Scale Carbon Fiber Material Response** R. Fu, A. Martin, University of Kentucky, Lexington, Lexington, KY	1430 hrs AIAA-2020-0483 **Desorption kinetics of O and CO from Graphitic Carbon Surfaces** K. Swaminathan Gopalan, K. Stephani, University of Illinois, Urbana-Champaign, Urbana, IL	1500 hrs AIAA-2020-0484 **Modeling Carbon fiber oxidation under high temperature by ReaxFF based molecular dynamics simulation** L. Shi, M. Sessim, M. Tonks, S. Phillpot, University of Florida, Gainesville, Gainesville, FL	1530 hrs AIAA-2020-0485 **Comparison of O_2-O vibrational relaxation and dissociation rate coefficients computed on potential energy surfaces of different fidelity** V. Baluckram, D. Andrienko, Texas A&M University, College Station, TX	1600 hrs AIAA-2020-0486 **Modeling High Velocity Flow Through Porous Media** U. Duzel, A. Martin, University of Kentucky, Lexington, Lexington, KY		

Monday, 6 January 2020						
130-UAS-2	**Detect and Avoid Technologies for UAS**					**Celebration 16**
Chaired by: V. SCHULTZ, NASA Langley Research Center						
1400 hrs AIAA-2020-0487 **Enhanced Potential Field-Based Collision Avoidance for Unmanned Aerial Vehicles in a Dynamic Environment** D. Choi, University of Cincinnati, Cincinnati, OH; K. Lee, Self, San Jose, CA; D. Kim, University of Cincinnati, Cincinnati, OH	1430 hrs AIAA-2020-0488 **Evaluating Collision Avoidance for Small UAS using ACAS X** J. Deaton, M. Owen, Lincoln Laboratory, Massachusetts Institute of Technology, Lexington, MA	1500 hrs AIAA-2020-0489 **Independent Authentication of ADS-B and Transponder Equipped Aircraft Location using a Tri-Band Avionic** V. Contarino, R Cubed Engineering, LLC, Palmetto, FL	1530 hrs AIAA-2020-0490 **Evasive Maneuvers of Optionally Piloted Air Vehicles For Three-Dimensional Geofencing** D. Seiferth, F. Holzapfel, M. Heller, Technical University of Munich, Garching, Germany	1600 hrs AIAA-2020-0491 **Acoustic Detection of Drones through Real-time Audio Attribute Prediction** S. Mandal, L. Chen, V. Alaparthy, M. Cummings, Duke University, Durham, NC		

Monday, 6 January 2020						
131-WE-2	**Blade Loads, Design, and Testing**					**Plaza Ballroom D**
Chaired by: J. RINKER and D. GRIFFITH, University of Texas at Dallas						
1400 hrs AIAA-2020-0492 **Impact of Site-Specific Thermal Residual Stress on the Fatigue of Wind Turbine Blades** A. Antoniou, M. Rosemeier, Fraunhofer IWES, Bremerhaven, Germany; K. Tazefidan, TU Berlin, Berlin, Germany; A. Krimmer, TPI Composites Germany GmbH, Berlin, Germany; G. Wolken-Möhlmann, Fraunhofer IWES, Bremerhaven, Germany	1430 hrs AIAA-2020-0493 **Investigating Core Gaps and the Development of Subcomponent Validation Methods for Wind Turbine Blades** P. Murdy, S. Hughes, National Renewable Energy Laboratory, Golden, CO	1500 hrs AIAA-2020-0494 **Model-based Blade Load Monitoring of Floating Wind Turbine Enhanced by Data Assimilation** N. Namura, K. Muto, Y. Ueki, N. Takeda, Hitachi Global, Hitachinaka, Japan	1530 hrs AIAA-2020-0495 **Aerodynamic Symmetry of Wind Turbines in Yawed Flow** J. Morote, National Institute of Aerospace Technology (INTA), Madrid, Spain			

Monday, 6 January 2020		
132-NW-6 1530 - 1600 hrs	Monday Afternoon Networking Coffee Break	Celebration and Regency Foyers

Monday, 6 January 2020		
133-NW-7 1730 - 1900 hrs	Technical Committee Showcase	Regency Ballroom Q
The AIAA Technical Committee (TC) Showcase provides an opportunity for SciTech Forum attendees to find out more about AIAA's TCs. The TCs are grouped into six groups under the Technical Activities Division: Aerospace Design and Structures; Aerospace Sciences; Information Systems; Propulsion and Energy; Aircraft Technology, Integration, and Operations; and, Space and Missiles. Representatives from all six groups will be present to answer questions and provide personal perspectives on the value of TC membership.		

Monday, 6 January 2020		
134-RLA-1 1730 - 1900 hrs	Rising Leaders in Aerospace Reception	Regency Ballroom O&P
Network with fellow young professionals and plan for the week ahead. You'll come away with at least a handful of new contacts, connections, and support.		

Monday, 6 January 2020		
135-NW-8 1900 - 2100 hrs	YP and Student Trivia Night Hosted by AIAA Membership	Regency Ballroom O&P
What percent of the universe is dark matter? What are the main parts of a comet? Take trivia to a new altitude with AIAA! Join us for a night of fun and compete for prizes with other students and young professionals. Light snacks and desserts will be provided. Each player will also be provided one drink ticket.* Boost your chances of winning by bringing your friends and forming a team. *The bar will be cash only after one drink. IDs will be checked to assure attendees seeking service or in possession of any alcoholic beverage are legally able to do so.		

Tuesday

Tuesday, 7 January 2020		
136-SB-2 0730 - 0800 hrs	Tuesday Speaker Briefing	Session Rooms

Tuesday, 7 January 2020		
137-PLNRY-2 0800 - 0900 hrs	The Next Giant Leap	Windermere Ballroom
Moderator: Nelson Pedreiro, Vice President, Advanced Technology Center, Lockheed Martin Space **Robert Lightfoot** Vice President, Strategy and Business Development Lockheed Martin Space		

Tuesday, 7 January 2020		
138-NW-9 0900 - 0930 hrs	Tuesday Morning Networking Coffee Break	Celebration and Regency Foyers

Tuesday, 7 January 2020						
139-AA-3	Jet Noise II					Peacock Spring
Chaired by: P. SHAH, ATA Engineering, Inc. and M. SAMIMY, The Ohio State University						
0930 hrs AIAA-2020-0496 **Noise Characteristics of Low Aspect Ratio Supersonic Twin Jet Configuration** K. Viswanath, J. Liu, R. Ramamurti, Naval Research Laboratory, Washington, D.C.; A. Karnam, F. Baier, E. Gutmark, University of Cincinnati, Cincinnati, OH	1000 hrs AIAA-2020-0497 **Supersonic Jet Noise Source Distributions** N. Breen, K. Ahuja, Georgia Institute of Technology, Smyrna, GA	1030 hrs AIAA-2020-0498 **Unsteady Characteristics of Resonant Supersonic Dual Impinging Jets** V. Nataraj Bhargav, M. Song, P. Sellappan, F. Alvi, R. Kumar, Florida State University, Tallahassee, FL	1100 hrs AIAA-2020-0499 **Noise Mitigation of a Supersonic Jet Using Shear Layer Swirl** S. Rahmani, M. Alhawwary, Z. Wang, J. Phommachanh, C. Hill, B. Hartwell, University of Kansas, Lawrence, Lawrence, KS; et al.	1130 hrs AIAA-2020-0500 **Nature of Flow field & Acoustics of Twin Supersonic Rectangular Jets** A. Karnam, F. Baier, E. Gutmark, University of Cincinnati, Cincinnati, OH		

Tuesday, 7 January 2020

140-ACD-7	Hybrid Electric Aircraft Design Under Clean Sky 2 (LPA WP1.6.1.4)					Orlando Ballroom L
Chaired by: P. SCHMOLLGRUBER, ONERA and R. VOS, TU Delft fac. Aerospace Engineering						
0930 hrs AIAA-2020-0501 **Multidisciplinary Design and performance of the ONERA Hybrid Electric Distributed Propulsion concept (DRAGON)** P. Schmollgruber, D. Donjat, M. Ridel, ONERA, Toulouse, France; I. Cafarelli, ONERA, Châtillon, France; O. Atinault, C. François, ONERA, Meudon, France; et al.	1000 hrs AIAA-2020-0502 **Aero-Propulsive Efficiency Requirements for Turboelectric Transport Aircraft** R. de Vries, M. Hoogreef, R. Vos, Delft University of Technology, Delft, The Netherlands	1030 hrs AIAA-2020-0503 **Synthesis of Aero-Propulsive Interaction Studies Applied to Conceptual Hybrid-Electric Aircraft Design** M. Hoogreef, R. de Vries, T. Sinnige, R. Vos, Delft University of Technology, Delft, The Netherlands	1100 hrs AIAA-2020-0504 **Multidisciplinary Investigation of Partially Turboelectric, Boundary Layer Ingesting Aircraft Concepts CleanSky2 LPA WP1.6.1 special session** D. Silberhorn, German Aerospace Center (DLR), Hamburg, Germany; M. Arzberger, German Aerospace Center (DLR), Oberpfaffenhofen, Germany; M. Mennicken, F. Wolters, C. Hollmann, German Aerospace Center (DLR), Cologne, Germany; M. Iwanizki, German Aerospace Center (DLR), Braunschweig, Germany	1130 hrs AIAA-2020-0505 **Energy Optimization of Single Aisle Aircraft with Hybrid Electric Propulsion** W. Lammen, J. Vankan, Netherlands Aerospace Center (NLR), Amsterdam, The Netherlands	1200 hrs AIAA-2020-0506 **Conceptual Design Studies of "Boosted Turbofan" Configuration for short range** T. Hecken, German Aerospace Center (DLR), Göttingen, Germany; X. Zhao, Mälarden University, Västerås, Sweden; M. Iwanizki, German Aerospace Center (DLR), Braunschweig, Germany; M. Arzberger, German Aerospace Center (DLR), Oberpfaffenhofen, Germany; D. Silberhorn, German Aerospace Center (DLR), Hamburg, Germany; M. Plohr, German Aerospace Center (DLR), Cologne, Germany; et al.	

Tuesday, 7 January 2020

141-AFM-5	Flight Test and System Identification II					Bayhill 18
Chaired by: N. FEZANS, DLR - German Aerospace Center and M. LONE, Cranfield University						
0930 hrs AIAA-2020-0507 **Elastic Torsion Effects on Helicopter Rotor loading in Forward Flight** A. Dayhoum, M. Zakaria, O. E. Abdelhamid, Military Technical College, Cairo, Egypt	1000 hrs AIAA-2020-0508 **Determining Handling Qualities Parameters: Lessons from the Frequency Domain** D. Klyde, P. Schulze, Systems Technology, Inc., Hawthorne, CA	1030 hrs AIAA-2020-0509 **An Instrumental Variable Approach for Aircraft Identification** M. Brunot, ONERA, Toulouse, France	1100 hrs AIAA-2020-0510 **Virtual Sensor Development for Actual Sensor Fault Detection and Flight Parameter Estimation in Real Time** M. Zahed, University of Missouri, Kansas City, Kansas City, MO; M. Alabsi, Pennsylvania State University, Erie, PA; T. Fields, University of Missouri, Kansas City, Kansas City, MO; D. Hetrick, Pennsylvania State University, Erie, PA	1130 hrs AIAA-2020-0511 **Unmanned Aerial Systems Mission Task Element Development: Lessons Learned from Flight Test** P. Schulze, J. Miller, D. Klyde, Systems Technology, Inc., Hawthorne, CA; C. Regan, C. Olson, University of Minnesota, Twin Cities, Minneapolis, MN; N. Alexandrov, NASA Langley Research Center, Hampton, VA	1200 hrs AIAA-2020-0512 **In-Flight Testing of MEMS Pressure Sensors for Flight Loads Determination** C. Raab, K. Rohde-Brandenburger, German Aerospace Center (DLR), Braunschweig, Germany	

Tuesday, 7 January 2020

142-AMT-5	Pressure Sensitive Paint II					Bayhill 23
Chaired by: H. SAKAUE, University of Notre Dame and N. ROOZEBOOM, NASA Ames Research Center						
0930 hrs AIAA-2020-0513 **Aeroacoustic Noise Source Identification Using Unsteady PSP and Microphone Correlation Measurement** K. Nakakita, H. Ura, Japan Aerospace Exploration Agency (JAXA), Chofu, Japan	1000 hrs AIAA-2020-0514 **Dynamic Characterization and Application of Pyrene-based Polymer Ceramic Pressure-Sensitive Paint** S. Claucherty, H. Sakaue, University of Notre Dame, Notre Dame, IN	1030 hrs AIAA-2020-0515 **Surface Pressure Measurement over Rotating Blade using Motion-Capturing PSP Method** D. Kurihara, T. Hayashi, H. Sakaue, University of Notre Dame, Notre Dame, IN	1100 hrs AIAA-2020-0516 **Recent Developments in NASA's Unsteady Pressure-Sensitive Paint Capability** N. Roozeboom, J. Baerny, D. Murakami, C. Ngo, NASA Ames Research Center, Moffett Field, CA; J. Powell, NASA Johnson Space Center, Houston, TX			

Tuesday, 7 January 2020						
143-AMT-6	**Spectroscopic Techniques II**					**Bayhill 21**
Chaired by: D. GUILDENBECHER, Sandia National Laboratories and C. DENNIS, Naval Air Warfare Center						
0930 hrs AIAA-2020-0517 **Ultrafast Laser Absorption Spectroscopy in the Mid-Infrared for Measuring Temperature and Species in Combustion Gases** R. Tancin, Z. Chang, V. Radhakrishna, M. Gu, R. Lucht, C. Goldenstein, Purdue University, West Lafayette, IN	1000 hrs AIAA-2020-0518 **Burst-Mode Spontaneous Raman Thermometry in a Flat Flame** C. Winters, Sandia National Laboratories, Albuquerque, NM; T. Haller, University of Texas, Austin, Austin, TX; J. Wagner, S. Kearney, Sandia National Laboratories, Albuquerque, NM; P. Varghese, University of Texas, Austin, Austin, TX	1030 hrs AIAA-2020-0519 **Post-Detonation Fireball Thermometry via 1D Rotational CARS** D. Richardson, S. Kearney, D. Guildenbecher, Sandia National Laboratories, Albuquerque, NM	1100 hrs AIAA-2020-0520 **Gas flow velocity and density limit estimates for single shot coherent Rayleigh-Brillouin scattering** A. Gerakis, Texas A&M University, College Station, TX; M. Shneider, Princeton University, Princeton, NJ	1130 hrs AIAA-2020-0521 **Hydrogen thermometry in aluminized propellant burns by hybrid fs/ps coherent anti-Stokes Raman scattering** J. Retter, D. Richardson, S. Kearney, Sandia National Laboratories, Albuquerque, NM		

Tuesday, 7 January 2020						
144-AMT-7/PC-7	**Combustion Diagnostics**					**Bayhill 22**
Chaired by: J. SUTTON, Ohio State University and W. KULATILAKA, Texas A & M University						
0930 hrs AIAA-2020-0522 **Impact of Fuel Properties on Combusting Jet Fuel Spray Breakup, Analyzed using High-Speed Phase Contrast Imaging** E. Wood, B. McGann, A. Motily, K. Min, K. Kim, T. Lee, University of Illinois, Urbana-Champaign, Urbana, IL; et al.	1000 hrs AIAA-2020-0523 **Applicability of Flame Chemiluminescence from Liquid, Heavy-Hydrocarbon Fuels** A. Gandomkar, J. Schihl, P. Allison, Michigan State University, East Lansing, MI	1030 hrs AIAA-2020-0524 **Single-Shot Detection of 2-D Chemiluminescence Emissions by Compressed Hyperspectral Imaging** Z. He, N. Williamson, C. Smith, University of Tennessee, Knoxville, Knoxville, TN; M. Gragston, University of Tennessee, Tullahoma, Tullahoma, TN; Z. Zhang, University of Tennessee, Knoxville, Knoxville, TN	1100 hrs AIAA-2020-0525 **Investigation of Flow-Flame Interactions in Kerosene Piloted Liquid-Spray Flames Using Simultaneous OH and PAH PLIF** A. Jain, Y. Wang, C. Schweizer, W. Kulatilaka, Texas A&M University, College Station, TX	1130 hrs AIAA-2020-0526 **Imaging and emission spectroscopy in optically dense metal cloud combustion** F. Reinbacher, K. Zhu, T. Sippel, J. Michael, Iowa State University, Ames, IA	1200 hrs AIAA-2020-0527 **Scanned-Wavelength-Modulation Spectroscopy in the Mid-Infrared for Measurements of Temperature and CO in Aluminized Composite Propellant Flames** M. Ruesch, G. Mathews, M. Blaisdell, S. Son, C. Goldenstein, Purdue University, West Lafayette, IN	

Tuesday, 7 January 2020						
145-APA-11	**Special Session: Rotor-in-Hover Simulations I**					**Florida Ballroom C**
Chaired by: N. HARIHARAN, HPCMP CREATE and R. JAIN, Aviation Development Directorate (AMRDEC)						
0930 hrs Oral Presentation **Hover Prediction Workshop Sessions: Summary and Future Plans** R. Narducci, The Boeing Company, Ridley Park, PA	1000 hrs AIAA-2020-0528 **Numerical Investigation of Rotor Aerodynamics Using High-Order Unstructured Grid Schemes** C. Sheng, Q. Zhao, S. Baugher, University of Toledo, Toledo, OH	1030 hrs AIAA-2020-0529 **Numerical Study of Isolated and Full Configuration PSP Rotor Using a Mixed Mesh Flow Solver** S. Park, O. Kwon, Korea Advanced Institute of Science and Technology, Daejeon, South Korea	1100 hrs AIAA-2020-0530 **An Overview of Wake-Breakdown in High-Fidelity Simulations of Rotor in Hover** N. Hariharan, CREATE Kestrel Team, Lorton, VA	1130 hrs AIAA-2020-0531 **Impact of High-fidelity Simulation Variations on Wake Breakdown of a Rotor in Hover** J. Abras, CREATE Kestrel Team, Lorton, VA; R. Narducci, The Boeing Company, Philadelphia, PA; N. Hariharan, CREATE Kestrel Team, Lorton, VA		

Tuesday, 7 January 2020						
146-APA-12	**High-Speed Aircraft Aerodynamics**					**Florida Ballroom B**
Chaired by: M. TUFTS, AFRL/RQHF and D. DURSTON, NASA Ames Research Center						
0930 hrs AIAA-2020-0532 **Effects of spanloading and slew angle on an Oblique Flying Wing** J. Deslich, S. Gunasekaran, P. Flick, University of Dayton, Dayton, OH; D. Szczublewski, Air Force Research Laboratory, Wright-Patterson AFB, OH	1000 hrs AIAA-2020-0533 **Accuracy of Küchemann's Prediction for the Locus of Aerodynamic Centers on Swept Wings** B. Moorthamers, D. Hunsaker, Utah State University, Logan, UT	1030 hrs AIAA-2020-0534 **Low-Speed and High Angle of Attack Aerodynamic Characteristics of Supersonic Business Jet with Forward Swept Wing** N. Setoguchi, M. Kanazaki, Tokyo Metropolitan University, Hino, Japan	1100 hrs AIAA-2020-0535 **Nonlinear Motion of Free Rolling Tail Rockets** J. Morote, P. Morote, National Institute of Aerospace Technology (INTA), Madrid, Spain	1130 hrs AIAA-2020-0536 **Study on Aerodynamic Characteristics of Supersonic Biplane installed Split Flap by Wake Measurement** N. Duong, M. Kashitani, M. Taguchi, K. Kusunose, Y. Takita, National Defense Academy, Yokosuka, Japan		

Tuesday, 7 January 2020

147-APA-13	Advanced Computational Methods for Aerodynamics I					Coral Spring I
Chaired by: K. SREENIVAS, University of Tennessee at Chattanooga and SimCenter and J. RAULEDER, Technical University of Munich						
0930 hrs AIAA-2020-0537 **An r-Adaptive, High-Order Discontinuous Galerkin Method for Flows with Attached Shocks** M. Zahr, University of Notre Dame, Notre Dame, IN; P. Persson, University of California, Berkeley, Berkeley, CA	1000 hrs AIAA-2020-0538 **CFD modeling of Unmanned Aerial Systems with Cut-cell Grids and Adaptive Mesh Refinement** I. Liu, R. Torelli, N. Prabhakar, D. Karbowski, Argonne National Laboratory, Lemont, IL	1030 hrs AIAA-2020-0539 **Analysing Rotorcraft Vortex Encounter Methods with a Lattice-Boltzmann Method Based GPU Framework** B. Horvat, M. Hajek, J. Rauleder, Technical University of Munich, Garching, Germany	1100 hrs AIAA-2020-0540 **Numerical Simulations of Free-to-Roll Wing Rock Phenomena by the Time Spectral CFD** R. Ohshima, K. Miyaji, Yokohama National University, Yokohama, Japan			

Tuesday, 7 January 2020

148-APA-14	Special Session: Aerodynamic Design Optimization Discussion Group II					Barrel Spring II
Chaired by: L. LEIFSSON, Iowa State University and S. LEDOUX, Boeing Engineering Operations & Technology						
0930 hrs AIAA-2020-0541 **Aerodynamic Shape Optimization for Two- and Three-Dimensional Unsteady Flows** K. Apponsah, D. Zingg, University of Toronto, Toronto, Canada	1000 hrs AIAA-2020-0542 **Applications of Polynomial Chaos-Based Cokriging to Aerodynamic Design Optimization Benchmark Problems** J. Nagawkar, L. Leifsson, Iowa State University, Ames, IA; X. Du, University of Michigan, Ann Arbor, Ann Arbor, MI	1030 hrs Oral Presentation **Aerodynamic Design Optimization of the Common-Research Model Wing-Body Case.** A. Kashi, McGill University, Montréal, Canada; Y. Hong, Bombardier Aerospace, Montreal, Canada; S. Nadarajah, McGill University, Montréal, Canada	1100 hrs AIAA-2020-0543 **Towards Generic Modal Design Variables for Aerodynamic Shape Optimisation** L. Kedward, C. Allen, T. Rendall, University of Bristol, Bristol, United Kingdom	1130 hrs AIAA-2020-0544 **Aerostructural Wing Design Exploration with Multidisciplinary Design Optimization** N. Bons, J. Martins, University of Michigan, Ann Arbor, Ann Arbor, MI		

Tuesday, 7 January 2020

149-AS-1
0930 - 1130 hrs

Smart Structures: Fantasy vs. Reality: Highlighting What Did Not Work

Orlando Ballroom N

Moderator: Roeland de Breuker, Delft University of Technology

Panelists:

Smart Structures Theory & Applications: Decade of Fantasy & Ignorance
Inderjit Chopra
University of Maryland

Piezos Fractured, Personnel Zapped, SMAs Stripped and Condoms Stretched: Lessons from the Early Days of Adaptive Aerostructures Research
Ronald Barrett
University of Kansas

Morphing in Aerospace: Aims, Challenges and Current Show-Stoppers
Salvatore Ameduri
Italian Aerospace Research Center

Q&A after the panel

Tuesday, 7 January 2020

150-CASE-2
0930 - 1130 hrs

MDO and MBSE: A Technology Roadmap Towards Digital Thread

Plaza Ballroom I

This session will focus on the identification of the open challenges and the technology and capability building blocks that should be considered, integrated and developed further to enable the Digital Thread. A shared roadmap will be assembled as outcome of the panel session.

Moderators: Laura Mainini, UTRC, and Pier Davide Ciampa, German Aerospace Center

Panelists:

Karen Willcox
Oden Institute for Computational Engineering and Sciences
University of Texas at Austin

Tresha Lacaux
Boeing Commercial Airplanes

Michael Grieves
Florida Institute of Technology

Tuesday, 7 January 2020

151-DE-3	Topics in Design Engineering - Design Tools and Processes II					Celebration 4
Chaired by: G. CREARY, NASA-Langley Research Center and C. DAVIES, Lockheed Martin Aeronautics						
0930 hrs AIAA-2020-0545 **Development of a Thermal Management System for Electrified Aircraft** J. Chapman, S. Schnulo, NASA Glenn Research Center, Cleveland, OH	1000 hrs AIAA-2020-0546 **Temporal Analysis and Visualization of Contaminant Molecular Transport using Augmented Reality during Extended Missions in Space** K. Bershinsky, G. Devaud, Ball Corporation, Boulder, CO	1030 hrs AIAA-2020-0547 **Using Boundary Condition and Topology Optimization to Design an Airplane Component** J. Persson, A. Wiberg, Linköping University, Linköping, Sweden	1100 hrs AIAA-2020-0548 **A Study of Numerical Methods of Convective Heat Transfer on Rough, Additively Manufactured Surfaces** J. Urcia, M. Kinzel, University of Central Florida, Orlando, FL	1130 hrs AIAA-2020-0549 **A Parametric Comparison of SSTO and TSTO Space Access Vehicle Concepts** E. Sorto-Ramos, K. Seyed Alavi, B. Chudoba, University of Texas, Arlington, Arlington, TX	1200 hrs AIAA-2020-0550 **Enabling Interactive Safety and Performance Trade-offs in Early Airframe Systems Design** S. Jimeno, A. Riaz, M. Guenov, A. Molina-Cristobal, Cranfield University, Cranfield, United Kingdom	

Tuesday, 7 January 2020

152-DGE-1	Digital Engineering					Celebration 11
Chaired by: B. KEPCZYNSKI, GE Global Research & Engineering Product Leader, GE Digital Technologies and N. STRAUP						
0930 hrs AIAA-2020-0551 **A Tool for Modeling Cyber-Physical Systems Software** C. Enyioha, University of Central Florida, Orlando, FL; J. Rife, Tufts University, Medford, MA	1000 hrs AIAA-2020-0552 **Digital Engineering Enabled Systems Engineering Performance Measures** E. Kraft, University of Tennessee, Tullahoma, Tullahoma, TN	1030 hrs AIAA-2020-0553 **The Digital Twin Paradigm for Aircraft Review and Outlook** H. Aydemir, U. Zengin, Turkish Armed Forces Foundation, Ankara, Turkey; U. Durak, German Aerospace Center (DLR), Braunschweig, Germany				

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153-F360-3 0930 - 1130 hrs	Forum 360: AI in Emerging Aerospace Manufacturing	Regency Ballroom Q

Moderator: Emilie "Mia" Siochi, Senior Scientist, Advanced Materials Processing Branch, NASA Langley Research Center

Panelists:

Tia Benson Tolle	Miranda Jones	Justin Kugler	Andrew Kwas	Wesley Smith
Director, Materials and Fabrication Boeing Commercial Airplanes	Manager, Business Analytics Spirit AeroSystems	Vice President, Advanced Programs and Concepts Made in Space	NG Fellow, Engineering Systems Architect Northrop Grumman Corporation	Digital Transformation Leader, Lockheed Martin Fellow Lockheed Martin Corporation

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154-FD-20	AVT-282: Aerodynamic Response of Rigid Wings in Gust Encounters II					Plaza Ballroom H
Chaired by: J. JAWORSKI, Lehigh University and K. MULLENERS, EPFL						
0930 hrs AIAA-2020-0554 **On the effects of discrete and continuous vortex-gust encounters (Invited)** A. Medina, Air Force Research Laboratory, Wright-Patterson AFB, OH; O. Cetiner, Istanbul Technical University, Istanbul, Turkey; M. Rockwood, Air Force Research Laboratory, Wright-Patterson AFB, OH; B. Zaloglu, M. Saritas, Istanbul Technical University, Istanbul, Turkey; A. Gozukara, ASELSAN, Inc., Ankara, Turkey	1000 hrs AIAA-2020-0555 **Aeroelastic encounters of spanwise vortex gusts and the self-rotation of trailing vortices (Invited)** H. Chen, J. Jaworski, Lehigh University, Bethlehem, PA	1030 hrs AIAA-2020-0556 **Quantification and modeling of dynamic lift on a DLR-F15 research airfoil with active trailing-edge flap (Invited)** J. Pohl, R. Semaan, Technical University of Braunschweig, Braunschweig, Germany	1100 hrs AIAA-2020-0557 **Unsteady Aerodynamic Loads on an Airfoil at High Angle of Attack in a Randomly Surging Flow (Invited)** X. He, D. Williams, Illinois Institute of Technology, Chicago, IL	1130 hrs AIAA-2020-0558 **The interaction of a Sears-type sinusoidal gust with a cambered aerofoil in the presence of non-uniform streamwise flow (Invited)** A. Young, University of Bath, Bath, United Kingdom; A. Smyth, University of Cambridge, Cambridge, United Kingdom	1200 hrs AIAA-2020-0559 **Comparison between experiments and simulations of fast tranverse plunge maneuvers (Invited)** M. Moriche, Karlsruhe Institute of Technology, Karlsruhe, Germany; O. Flores, Charles III University of Madrid, Leganés, Spain; G. Sedky, A. Jones, University of Maryland, College Park, College Park, MD; M. Garcia-Villalba, Charles III University of Madrid, Leganés, Spain	

Tuesday, 7 January 2020						
155-FD-21	**AIAA-JSASS Joint Session on Boundary Layer Modification (Invited)**					**Orlando Ballroom M**
Chaired by: M. HEMATI, University of Minnesota and T. NONOMURA, Tohoku University						
0930 hrs Oral Presentation **Physical and Virtual Surface Modification for Boundary Layer Control (Invited)** M. Amitay, Rensselaer Polytechnic Institute, Troy, NY	1000 hrs Oral Presentation **Drag Reduction Mechanisms of 3D Riblets and Its Application to the Aircrafts (Invited)** K. Okabayashi, Osaka University, Suita, Japan	1030 hrs Oral Presentation **Model-based Predictions for Optimal Two-dimensional Riblet Geometries (Invited)** A. Chavarin, M. Luhar, University of Southern California, Los Angeles, CA	1100 hrs Oral Presentation **Experimental study on near wall turbulence structure and drag-reducing effect of riblets (Invited)** A. Inasawa, M. Asai, S. Takagi, Tokyo Metropolitan University, Hino, Japan; M. Kurita, Japan Aerospace Exploration Agency (JAXA), Mitaka, Japan	1130 hrs Oral Presentation **Turbulent Drag Reduction in High-Speed Boundary Layers via Riblets (Invited)** L. Duan, Ohio State University, Columbus, OH; M. Choudhari, NASA Langley Research Center, Hampton, VA	1200 hrs AIAA-2020-0560 **Flight Test for Paint-Riblet (Invited)** M. Kurita, H. Iijima, S. Koga, A. Nishizawa, D. Kwak, Y. Iijima, Japan Aerospace Exploration Agency (JAXA), Mitaka, Japan; et al.	

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156-FD-22	**Low-Frequency Unsteadiness in Separated Flows I**					**Blue Spring II**
Chaired by: J. LITTLE, The University of Arizona and J. WEISS, TU Berlin						
0930 hrs Oral Presentation **Low-Frequency Unsteadiness in a Family of Incompressible Turbulent Separation Bubbles (Invited)** J. Weiss, Technical University of Berlin, Berlin, Germany	1000 hrs AIAA-2020-0561 **Normalizing Low--Frequency Unsteadiness in Compressible Separated Flow (Invited)** L. Larchevêque, Aix-Marseille University, Marseille, France	1030 hrs Oral Presentation **Laminar Separation Bubble Bursting and Low Frequency Modulations: Prior Work and Recent Developments (Invited)** J. Kurelek, University of Waterloo, Waterloo, Canada; M. Kotsonis, Delft University of Technology, Delft, The Netherlands; S. Yarusevych, University of Waterloo, Waterloo, Canada	1100 hrs Oral Presentation **Low-Frequency Unsteadiness in Transitional Shock/Boundary Layer Interactions (Invited)** J. Schmisseur, University of Tennessee, Tullahoma, Tullahoma, TN; R. Bowersox, Texas A&M University, College Station, TX; C. Combs, University of Texas, San Antonio, San Antonio, TX; J. Coder, University of Tennessee, Knoxville, Knoxville, TN; M. Gragston, University of Tennessee, Tullahoma, Tullahoma, TN; R. Glasby, University of Tennessee, Knoxville, Knoxville, TN; et al.	1130 hrs Oral Presentation **Stability and receptivity in compressible separated flows (Invited)** J. Robinet, Paris Institute of Technology, Paris, France	1200 hrs Oral Presentation **Flow Physics and Nonlinear Dynamics of Pressure-Gradient-Induced Turbulent Separation Bubbles (Invited)** W. Wu, Johns Hopkins University, Baltimore, MD; A. Padovan, C. Rowley, Princeton University, Princeton, NJ; L. Cattafesta, Florida State University, Tallahassee, FL; C. Meneveau, R. Mittal, Johns Hopkins University, Baltimore, MD	

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157-FD-23	**CFD Methods III**					**Rainbow Spring II**
Chaired by: M. BELISLE, Northrop Grumman Corporation and W. ANDERSON, NASA Langley Research Center						
0930 hrs AIAA-2020-0562 **Interface-fitted Simulation of Multi-Material Sheath Flow using MDG-ICE** D. Mott, A. Kercher, A. Adams, J. Yuen, R. Johnson, A. Corrigan, Naval Research Laboratory, Washington, D.C.; et al.	1000 hrs AIAA-2020-0563 **Convergence Acceleration of the Harmonic Balance Method using a Time-Level Preconditioner** D. Lindblad, N. Andersson, Chalmers University of Technology, Gothenburg, Sweden	1030 hrs AIAA-2020-0564 **Stability Based Transition Transport Modeling for Unstructured Computational Fluid Dynamics Under Transonic Flow Conditions** P. Ströer, German Aerospace Center (DLR), Göttingen, Germany; N. Krimmelbein, German Aerospace Center (DLR), Braunschweig, Germany; A. Krumbein, C. Grabe, German Aerospace Center (DLR), Göttingen, Germany	1100 hrs AIAA-2020-0565 **Stable, non-dissipative and physically-consistent kinetic energy and entropy preserving (KEEP) schemes for compressible flows** Y. Kuya, S. Kawai, Tohoku University, Sendai, Japan	1130 hrs AIAA-2020-0566 **Effect of Flux Function Order and Working Precision in Spectral Element Methods** W. Trojak, University of Cambridge, Cambridge, United Kingdom; A. Scillitoe, Alan Turing Institute, London, United Kingdom; R. Watson, Queen's University Belfast, Belfast, United Kingdom	1200 hrs AIAA-2020-0567 **A High-Resolution Primitive Variable Solver for Compressible Flow Simulation** A. Jemcov, University of Notre Dame, Notre Dame, IN; D. Stephens, Applied CCM Pty., Ltd., Melbourne, Australia; S. Wahono, Department of Defence, Melbourne, Australia	

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158-FD-24	**Fluid Structure Interactions II**					**Blue Spring I**
Chaired by: R. KUMAR, Florida State University and F. LAGOR, University at Buffalo, The State University of New York						
0930 hrs AIAA-2020-0568 **Oblique Shockwave Boundary Layer Interactions on a Flexible Panel at Mach 2** A. Tripathi, L. Mears, K. Shoele, R. Kumar, Florida State University, Tallahassee, FL	1000 hrs AIAA-2020-0569 **Numerical simulations of the vibro-acoustic response of a flexible panel subjected to a Mach 2 turbulent boundary layer** S. Le Bras, K. Kucukcoskun, Siemens Industry Software N.V., Leuven, Belgium; G. Grossir, Y. Kucukosman, C. Schram, von Kármán Institute for Fluid Dynamics, Rhode-Saint-Genèse, Belgium	1030 hrs AIAA-2020-0570 **Shock Boundary Layer Interaction Induced Surface Pressure Field on an Axisymmetric Body** F. Mason, R. Kumar, Florida State University, Tallahassee, FL				

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159-FD-25	**Turbulent Flows III**					**Rainbow Spring I**
Chaired by: H. BAE, California Institute of Technology and C. BREHM, University of Kentucky						
0930 hrs AIAA-2020-0571 **Simulation and Modeling of Cold-Wall Hypersonic Turbulent Boundary Layers on Flat Plate** J. Huang, G. Nicholson, L. Duan, Ohio State University, Columbus, OH; M. Choudhari, NASA Langley Research Center, Hampton, VA; R. Bowersox, Texas A&M University, College Station, TX	1000 hrs AIAA-2020-0572 **Wall Pressure Fluctuations in an Axisymmetric Turbulent Boundary Layer under Strong Adverse Pressure Gradient** N. Balantrapu, D. Fritsch, A. Millican, C. Hickling, A. Gargiulo, V. Vishwanathan, Virginia Polytechnic Institute and State University, Blacksburg, VA; et al.	1030 hrs AIAA-2020-0573 **Compressibility Effects in High Speed Turbulent Shear Layers – Revisited** K. Matsuno, S. Lele, Stanford University, Stanford, CA	1100 hrs AIAA-2020-0574 **Reynolds number dependency in supersonic spatially-developing turbulent boundary layers** G. Araya, C. Lagares, University of Puerto Rico, Mayaguez, ; K. Jansen, University of Colorado, Boulder, Boulder, CO	1130 hrs AIAA-2020-0575 **Studying the effect of wall cooling in supersonic boundary layer flow using resolvent analysis** H. Bae, California Institute of Technology, Pasadena, CA; S. Dawson, Illinois Institute of Technology, Chicago, IL; B. McKeon, California Institute of Technology, Pasadena, CA		

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160-FD-26	**Flow Control II**					**Plaza Ballroom K**
Chaired by: B. RAFFERTY, Boeing and S. BENTON, Air Force Research Laboratory						
0930 hrs AIAA-2020-0576 **Computations of Trailing Edge Fluidic Actuation for Active Flow Control at Low Angles of Attack** R. Patterson, P. Friedmann, University of Michigan, Ann Arbor, Ann Arbor, MI	1000 hrs AIAA-2020-0577 **The Sensitivity of Leading-Edge Momentum Injection Response to Instantaneous Flow State for an Airfoil in Deep Stall** K. Asztalos, S. Dawson, D. Williams, Illinois Institute of Technology, Chicago, IL	1030 hrs AIAA-2020-0578 **Computational Analysis of the Control Authority of Plasma Actuators for Airfoil Flows at Low Angle of Attack** T. Ogawa, K. Asada, T. Tatsukawa, K. Fujii, Tokyo University of Science, Katsushika, Japan	1100 hrs AIAA-2020-0579 **Experimental Study on Application of Distributed Deep Reinforcement Learning to Closed-loop Flow separation Control over an Airfoil** S. Shimomura, Tokyo University of Agriculture and Technology, Tokyo, Japan; S. Sekimoto, Tokyo University of Science, Tokyo, Japan; A. Oyama, Japan Aerospace Exploration Agency (JAXA), Kanagawa, Japan; K. Fujii, Tokyo University of Science, Tokyo, Japan; H. Nishida, Tokyo University of Agriculture and Technology, Tokyo, Japan			

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161-FD-27	**Shock Dominated Flows**					**Rock Spring I & II**
Chaired by: J. THREADGILL, University of Arizona and S. WOOD, NASA Langley Research Center						
0930 hrs AIAA-2020-0580 **Root Influence on the Unsteady Characteristics of Swept Impinging Oblique SBLIs** S. Padmanabhan, J. Castro Maldonado, J. Threadgill, J. Little, University of Arizona, Tucson, Tucson, AZ	1000 hrs AIAA-2020-0581 **Unsteadiness of Shock-Wave/ Boundary-Layer Interaction with Sidewalls** A. Deshpande, J. Poggie, Purdue University, West Lafayette, IN	1030 hrs AIAA-2020-0582 **Some effects of tunnel noise on cylinder-induced Mach 6 transitional shock wave boundary layer interactions** A. Leidy, I. Neel, N. Tichenor, R. Bowersox, Texas A&M University, College Station, TX; J. Schmisseur, University of Tennessee, Tullahoma, Tullahoma, TN	1100 hrs AIAA-2020-0583 **Aerodynamic Heating in Missile-Fin Interaction Region** D. Fano, J. Poggie, G. Blaisdell, Purdue University, West Lafayette, IN	1130 hrs AIAA-2020-0584 **Tomographic PIV in Fin-Generated Shock Wave/Boundary-Layer Interaction at Mach 2** L. Mears, P. Sellappan, F. Alvi, Florida A&M University-Florida State University, Tallahassee, FL		

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162-FD-28	**Instability and Transition III**					**Plaza Ballroom J**
Chaired by: C. HADER and J. EPPINK, NASA Langley Research Center						
0930 hrs AIAA-2020-0585 **Wave packets on a flared cone at Mach 6** C. Hader, H. Fasel, University of Arizona, Tucson, Tucson, AZ	1000 hrs AIAA-2020-0586 **Direct Numerical Simulations of the Nonlinear Transition Regime on a Flat Plate at Mach 6** M. Leinemann, C. Hader, H. Fasel, University of Arizona, Tucson, Tucson, AZ	1030 hrs AIAA-2020-0587 **Direct Numerical Simulations of Acoustic Disturbances in Various Rectangular Nozzle Configurations** N. Hildebrand, M. Choudhari, NASA Langley Research Center, Hampton, VA; L. Duan, Ohio State University, Columbus, OH	1100 hrs AIAA-2020-0588 **Instability characteristics of cooled hypersonic boundary layers** S. Unnikrishnan, D. Gaitonde, Ohio State University, Columbus, OH	1130 hrs AIAA-2020-0589 **Variable Frequency Disturbances on a Flared Cone at Mach 6** A. Batista, J. Kuehl, University of Delaware, Newark, Newark, DE	1200 hrs AIAA-2020-0590 **Measurements of Second-Mode Dominated Transition on a Straight Cone in the Boeing/AFOSR Mach-6 Quiet Tunnel** K. Gray, S. Schneider, Purdue University, West Lafayette, IN	

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163-GNC-6/IS-4	**Advances in Adaptive Control for Aerospace Systems I (Invited)**					**Celebration 9**
Chaired by: K. DOGAN and T. YUCELEN, University of South Florida						
0930 hrs AIAA-2020-0591 **Model Reference Adaptive Control of Uncertain Dynamical Systems Subject to High-Order Actuator Dynamics with Performance Guarantees (Invited)** E. Arabi, D. Panagou, University of Michigan, Ann Arbor, Ann Arbor, MI; T. Yucelen, University of South Florida, Tampa, FL; N. Nguyen, NASA Ames Research Center, Moffett Field, CA	1000 hrs AIAA-2020-0592 **An Adaptive Flight Control system for a Morphing Flapping Wing Aircraft (Invited)** B. Chandrasekaran, J. Steck, Wichita State University, Wichita, KS	1030 hrs AIAA-2020-0593 **An Adaptive Flight Controller Design for a Tilt-Prop Fixed Wing UAV for All Flight Modes (Invited)** M. Yayla, A. Kutay, M. Senipek, O. Gungor, Middle East Technical University, Ankara, Turkey	1100 hrs AIAA-2020-0594 **Fast Parameter Convergence in Adaptive Flight Control (Invited)** J. Gaudio, A. Annaswamy, Massachusetts Institute of Technology, Cambridge, MA; E. Lavretsky, The Boeing Company, Huntington Beach, CA; M. Bolender, Air Force Research Laboratory, Wright-Patterson AFB, OH	1130 hrs AIAA-2020-0595 **Performance Guarantees in Adaptive Control of Uncertain Systems with Unmodeled Dynamics (Invited)** K. Dogan, T. Yucelen, University of South Florida, Tampa, FL; J. Muse, Air Force Research Laboratory, Wright-Patterson AFB, OH	1200 hrs AIAA-2020-0596 **Observer-Based Design to Mathematically Model Human Behavior in a Cursor Tracking Game (Invited)** Y. Lu, R. Sipahi, Y. Wang, Northeastern University, Boston, MA; T. Yucelen, University of South Florida, Tampa, FL	

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164-GNC-7	**Entry, Descent and Landing GN&C Technology II (Invited)**					**Bayhill 31**
Chaired by: J. CARSON, NASA and K. DEMARS, Texas A&M University						
0930 hrs AIAA-2020-0597 **Mars Entry Guidance and Navigation Analysis Using Linear Covariance Techniques for the Safe and Precise Landing -- Integrated Capabilities Evolution (SPLICE) Project** J. Williams, University of Illinois, Urbana-Champaign, Urbana, IL; D. Woffinden, NASA Johnson Space Center, Houston, TX; Z. Putnam, University of Illinois, Urbana-Champaign, Urbana, IL	1000 hrs AIAA-2020-0598 **Anonymous Feature Processing for Efficient Onboard Navigation** J. McCabe, NASA Johnson Space Center, Houston, TX; K. DeMars, Texas A&M University, College Station, TX	1030 hrs AIAA-2020-0599 **Propagation of Errors Through Coning, Sculling, and Scrolling Correction Algorithms** J. Brouk, K. DeMars, Missouri University of Science and Technology, Rolla, MO	1100 hrs AIAA-2020-0600 **Impact of Considering and Neglecting States on Descent-to-Landing Navigation** K. DeMars, K. Ward, Missouri University of Science and Technology, Rolla, MO	1130 hrs AIAA-2020-0601 **A Comparison of Feature Extraction Methods for Terrain Relative Navigation** A. Simon, M. Majji, Texas A&M University, College Station, TX; C. Restrepo, NASA Goddard Space Flight Center, Greenbelt, MD; R. Lovelace, NASA Johnson Space Center, Houston, TX		

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165-GNC-8	Aircraft Control I					Bayhill 32
Chaired by: D. CARAWAY, Lockheed Martin Aero and T. FRASER, Lockheed Martin Aero						
0930 hrs AIAA-2020-0602 **A Nested Robust Controller Design for Interconnected Vehicles** B. Taner, R. Bhusal, K. Subbarao, University of Texas, Arlington, Arlington, TX	1000 hrs AIAA-2020-0603 **Nonlinear Controller Design for Non-minimum Phase Flight System Enhanced by Adaptive Elevator Algorithm** S. Kim, University of Central Florida, Orlando, FL; K. Horspool, Lockheed Martin Corporation, Orlando, FL	1030 hrs AIAA-2020-0604 **UAS Model Identification and Simulation to Support In-Flight Testing of Discrete Adaptive Fault-Tolerant Control Laws** M. Bakori, H. Moncayo, Embry-Riddle Aeronautical University, Daytona Beach, FL	1100 hrs AIAA-2020-0605 **Nonlinear Frequency Response Analysis to Inform Aircraft Control Law Design** D. Nguyen, M. Lowenberg, S. Neild, University of Bristol, Bristol, United Kingdom	1130 hrs AIAA-2020-0606 **More Integrated Total Energy Control Law for Longitudinal Automatic Flight Control System Design** T. Giusti Degaspare, K. Kienitz, Technological Institute of Aeronautics (ITA), São José dos Campos, Brazil	1200 hrs AIAA-2020-0607 **Composite Immersion and Invariance-Based Adaptive Wing-Rock Motion Control** K. Lee, Catholic Kwandong University, Gangneung, South Korea; S. Singh, University of Nevada, Las Vegas, Las Vegas, NV	

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166-GNC-9	Missile Guidance and Control I					Bayhill 33
Chaired by: M. MCFARLAND, Raytheon and G. INALHAN, Cranfield University						
0930 hrs AIAA-2020-0608 **Finite-Time Missile Guidance Law with LOS Rate for Maneuvering Targets** B. Jayaraman, K. Gaurav, D. Giri, A. Ghosh, Indian Institute of Technology Kanpur, Kanpur, India	1000 hrs AIAA-2020-0609 **A Guidance Law for Terminal Phase Exo-Atmospheric Interception Against a Maneuvering Target using Angle-Only Measurements Optimized using Reinforcement Meta-Learning** B. Gaudet, R. Furfaro, University of Arizona, Tucson, Tucson, AZ; R. Linares, Massachusetts Institute of Technology, Cambridge, MA	1030 hrs AIAA-2020-0610 **Super-Twisting Control based Impact Time Constrained Guidance** A. Sinha, S. Kumar, Indian Institute of Technology Bombay, Mumbai, India	1100 hrs AIAA-2020-0611 **Path Length Constrained Interception of Higher Speed Targets Using Retro-Proportional Navigation Guidance Law** S. Nath, D. Ghose, Indian Institute of Science, Bengaluru, India			

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167-GNC-10	Control and Autonomy II					Bayhill 17
Chaired by: J. RAMAKRISHNAN, Bastion Technologies, Inc. and J. DYKES, Georgia Institute of Technology						
0930 hrs AIAA-2020-0612 **Direct Methods Comparison for the Active Target Defense Scenario** I. Weintraub, Air Force Research Laboratory, Wright-Patterson AFB, OH; R. Cobb, W. Baker, M. Pachter, Air Force Institute of Technology, Wright-Patterson AFB, OH	1000 hrs AIAA-2020-0613 **Collaborative Mapping of Semi-Structured Environment for Path Planning of Autonomous Vehicles** B. Jabr, M. Kumar, Ohio State University, Columbus, OH	1030 hrs AIAA-2020-0614 **Optimally Adhering to Behavioral Priors in Unknown Environments with RRTs** E. Evans, P. Meyer, Georgia Institute of Technology, Atlanta, GA; M. Bays, Naval Surface Warfare Center, Panama City, FL; D. Mavris, E. Theodorou, Georgia Institute of Technology, Atlanta, GA	1100 hrs AIAA-2020-0615 **Application of Chance-Constrained and Sample-Based Path Search for High Level Behavioural Planning: A Case Study of Autonomous Highway Lane Change Scenario** K. Turkoglu, J. Selvakumar, NIO, San Jose, CA	1130 hrs AIAA-2020-0616 **Fast Trajectory Optimization via Successive Convexification for Spacecraft Rendezvous with Integer Constraints** D. Malyuta, T. Reynolds, M. Szmuk, B. Acikmese, M. Mesbahi, University of Washington, Seattle, Seattle, WA	1200 hrs AIAA-2020-0617 **Decentralized Position and Attitude Based Formation Control for Satellite Systems with Electromagnetic Actuation** Z. Abbasi, J. Hoagg, T. Seigler, University of Kentucky, Lexington, Lexington, KY	

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168-GRE-2	Green Engineering					Plaza Ballroom D
Chaired by: T. ABDEL-SALAM, East Carolina University and N. HICKS						
0930 hrs AIAA-2020-0618 **A Stratospheric Aerosol Injection Lofter Aircraft Concept: Brimstone Angel** D. Bingaman, C. Rice, VPE Aerospace Consulting, LLC, St. Louis, MO; W. Smith, Yale University, New Haven, CT; P. Vogel, Creve Coeur Research and Engineering, Corporation, St. Louis, MO	1000 hrs AIAA-2020-0619 **Preliminary Analysis of Ice Accretion Prediction on Wind Turbine Blades** M. Abbadi, I. Mussa, Y. Lin, J. Wang, Kingston University London, London, United Kingdom	1030 hrs AIAA-2020-0620 **Comparison of Leader and Tail Switching with Full Shuffle in Swarming V-shaped drones: Efficiency and Sensitivity Analysis** A. Mirzaeinia, New Mexico Institute of Mining and Technology, Socorro, NM; M. Mirzaeinia, Amirkabir University of Technology, Tehran, Iran; M. Shekaramiz, Utah Valley University, Orem, UT; M. Hassanalian, New Mexico Institute of Mining and Technology, Socorro, NM				

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169-GT-3	Advancement in High Enthalpy and High Temperature Shock Tube Facilities					Bayhill 24
Chaired by: C. MORRIS, Arnold Engineering Development Complex and M. RIVERS, NASA Langley Research Center						
0930 hrs AIAA-2020-0621 **Characterizing nonequilibrium at the shock front in high-enthalpy shock tube experiments with pure oxygen** G. Flora, F. Karimzadeh, K. Grinstead, T. Yamada, M. Kahandawala, University of Dayton, Dayton, OH; I. Adamovich, Ohio State University, Columbus, OH; et al.	1000 hrs AIAA-2020-0622 **Early Experiments on Shock-Particle Interactions in the High-Temperature Shock Tube** S. Petter, K. Lynch, P. Farias, S. Spitzer, T. Grasser, J. Wagner, Sandia National Laboratories, Albuquerque, NM	1030 hrs AIAA-2020-0623 **Plasma Driven Shock Tube** D. Bivolaru, G. Papadopoulos, Innoveering, LLC, Ronkonkoma, NY	1100 hrs AIAA-2020-0624 **Qualification of the European Shock-Tube for High Enthalpy Research** M. Lino Da Silva, R. Ferreira, R. Rodrigues, L. Alves, B. Gonçalves, Technical University of Lisbon, Lisbon, Portugal; A. Smith, Fluid Gravity Engineering, Ltd., London, United Kingdom; et al.			

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170-GTE-5	Combustors I					Manatee Spring II
Chaired by: D. CULLEY, NASA Glenn Research Center and J. MODER, NASA Glenn Research Center						
0930 hrs AIAA-2020-0625 **Analysis of a Compact Combustor for Use in a JetCat P90 RXi** D. Holobeny, M. Polanka, B. Bohan, Air Force Institute of Technology, Wright-Patterson AFB, OH	1000 hrs AIAA-2020-0626 **Flow Characterization and Combustion Analysis for a Disk-Oriented Engine** B. Staton, B. Bohan, M. Polanka, Air Force Institute of Technology, Wright-Patterson AFB, OH	1030 hrs AIAA-2020-0627 **Emission Characteristics of an Axially Staged Sector Combustor** Z. He, T. Capil, D. Podboy, NASA Glenn Research Center, Cleveland, OH; L. Smith, United Technologies Corporation, East Hartford, CT	1100 hrs AIAA-2020-0628 **Numerical Modeling and Analysis of Afterburner Combustion of a Low Bypass Ratio Turbofan Engine** M. Safdar, National University of Sciences and Technology, Islamabad, Pakistan; B. Mufti, J. Masud, Air University, Islamabad, Pakistan	1130 hrs AIAA-2020-0629 **Soot Evolution in a JP-Fueled Gas-Turbine Swirl Combustor** M. Darbandi, M. Ghafourizadeh, Sharif University of Technology, Tehran, Iran; G. Schneider, University of Waterloo, Waterloo, Canada	1200 hrs AIAA-2020-0630 **Numerical Simulation of an Axial-Staged Combustor at High Pressure** B. Stiehl, T. Worbington, A. Woodard, K. Ahmed, University of Central Florida, Orlando, FL; C. Velez, General Electric Company, Niskayuna, NY; S. Martin, Embry-Riddle Aeronautical University, Daytona Beach, FL	

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171-GTE-6	Turbines I					Barrel Spring I
Chaired by: S. LYNCH, Penn State and M. KINZEL						
0930 hrs AIAA-2020-0631 **Doped 8% Yttria Stabilized Zirconia for Temperature Measurements on Thermal Barrier Coatings using Phosphor Thermometry** Q. Fouliard, R. Ghosh, S. Raghavan, University of Central Florida, Orlando, FL	1000 hrs AIAA-2020-0632 **Comparison of thermally cycled PS-PVD and EB-PVD thermal barrier coatings' depth-resolved monoclinic phase evolution via synchrotron X-ray diffraction** M. Northam, L. Rossmann, B. Sarley, M. Smith, University of Central Florida, Orlando, FL; P. Kenesei, J. Park, Argonne National Laboratory, Argonne, IL; et al.	1030 hrs AIAA-2020-0633 **Unsteady Behavior of Wall Bounded Harbor Seal Whisker Inspired Pin Geometries** A. Prasad, M. Ricklick, Embry-Riddle Aeronautical University, Daytona Beach, FL	1100 hrs AIAA-2020-0634 **Conjugate Heat Transfer Study of Innovative Pin-Fin Cooling Configurations** M. Hossain, M. Asar, A. Ameri, J. Bons, Ohio State University, Columbus, OH	1130 hrs AIAA-2020-0635 **Effect of Cylinder vortex shedding on downstream Impinging Jet Oscillation through Wake Interaction** K. Krishna, M. Ricklick, Embry-Riddle Aeronautical University, Daytona Beach, FL	1200 hrs AIAA-2020-0636 **Effects of High Freestream Turbulence on Film Cooling Effectiveness of Shaped Holes** R. Macias, M. Polanka, J. Rutledge, Air Force Institute of Technology, Wright-Patterson AFB, OH	

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172-GTE-7/PC-8	Fuels and Kinetics					Bayhill 25
Chaired by: D. BLUNCK, Oregon State University and B. RANKIN, Air Force Research Laboratory						
0930 hrs AIAA-2020-0637 **Simultaneous measurements of carbon monoxide and ethylene time-histories during rich oxidation of a jet fuel surrogate behind reflected shock waves** R. Rahman, F. Arafin, S. Neupane, R. Greene, E. Ninnemann, S. Vasu, University of Central Florida, Orlando, FL	1000 hrs AIAA-2020-0638 **Autoignition delay times measurements of linear unsaturated jet fuel compounds inside a shock tube** E. Ninnemann, E. Shafer, J. Baker, F. Arafin, S. Vasu, University of Central Florida, Orlando, FL	1030 hrs AIAA-2020-0639 **Laminar burning velocity measurements of high-performance jet fuel/air mixtures** G. Kim, A. Terracciano, S. Vasu, University of Central Florida, Orlando, FL	1100 hrs AIAA-2020-0640 **The Effects of Turbulence-Kinetics Interactions on Reducing Chemical Mechanisms** S. Martin, Embry-Riddle Aeronautical University, Daytona Beach, FL	1130 hrs AIAA-2020-0641 **Ignition of Conventional and Alternative Jet Fuels at Altitude Conditions** E. Mayhew, C. Mitsingas, V. Coburn, J. Temme, C. Kweon, Army Research Laboratory, Aberdeen Proving Ground, MD	1200 hrs AIAA-2020-0642 **An Investigation Into the Feasibility of Alternative Aviation Fuels** A. Prakash, J. Davies, Teesside University, Middlesbrough, United Kingdom	

Tuesday, 7 January 2020						
173-HIS-1	**History of Aerospace I: Aeronautics**					**Plaza Ballroom F**
Chaired by: R. HALLION, Fellow AIAA, Fellow RAeS, Fellow RHistS and K. BURNS						
0930 hrs AIAA-2020-0643 **80 Years of Aerospace Engineering Education in the Netherlands** G. Saunders-Smits, J. Melkert, M. Schuurman, Delft University of Technology, Delft, The Netherlands	1000 hrs AIAA-2020-0644 **Ludwig Prandtl's 1933 Paper Concerning Wings for Minimum Induced Drag, Translation and Commentary** D. Hunsaker, W. Phillips, Utah State University, Logan, UT	1030 hrs AIAA-2020-0645 **Geostrategic Conjuncture of Commercial and Civil Aviation at Portugal on Early 20th Century** F. Neves, J. Barata, A. Silva, University of Beira Interior, Covilha, Portugal	1100 hrs AIAA-2020-0646 **The Wild West of Aviation: An Overview of Unmanned Aircraft Systems Regulation in the United States** P. Thomas, T. Takahashi, Arizona State University, Tempe, AZ	1130 hrs AIAA-2020-0647 **Nightingales of the Space Program** A. Lind, Oviedo High School, Oviedo, FL; K. Burns, American Legion, Chula Vista, CA		

Tuesday, 7 January 2020						
174-HSABP-3	**Numerical Analysis of Ramjet/Scramjet Engines I**					**Florida Ballroom A**
Chaired by: T. O'BRIEN, Raytheon Missiles Systems and L. ZHANG, University of Texas at Arlington						
0930 hrs AIAA-2020-0648 **Flow and Flame Dynamics in a Hydrocarbon-fueled Dual-Combustion Ramjet Engine** L. Zhang, University of Texas at Arlington, Arlington, TX; H. Sung, Korea Aerospace University, Goyang, South Korea; V. Yang, Georgia Institute of Technology, Atlanta, GA	1000 hrs AIAA-2020-0649 **Predicting Ignition Probability Using a Backwards-Time Integration Scheme** P. Ivancic, E. Luke, Mississippi State University, Mississippi State, MS; E. Hassan, T. Ombrello, D. Peterson, Air Force Research Laboratory, Wright-Patterson AFB, OH	1030 hrs AIAA-2020-0650 **Numerical Simulation of Flow through Scramjet Inlet - Isolator Model with Pressure Feedback** Y. Sarout, T. R, S. Paramasivam, Vellore Institute of Technology, Vellore, India	1100 hrs AIAA-2020-0651 **Reacting RANS Simulations of a Dual-Mode Ramjet Combustor: A Code Credibility Study** B. Bornhoft, D. Peterson, T. Eymann, E. Hassan, M. Hagenmaier, Air Force Research Laboratory, Wright-Patterson AFB, OH; R. Baurle, NASA Langley Research Center, Hampton, VA	1130 hrs AIAA-2020-0652 **A 3-D Nodal-Averaged Gradient Approach For Unstructured-Grid Cell-Centered Finite-Volume Methods For Application to Turbulent Hypersonic Flow** J. White, NASA Langley Research Center, Hampton, VA; H. Nishikawa, National Institute of Aerospace, Hampton, VA; R. Baurle, NASA Langley Research Center, Hampton, VA		

Tuesday, 7 January 2020						
175-ICME-2	**ICME Prize Competition**					**Celebration 6**
Chaired by: S. ARNOLD, NASA Glenn Research Center and W. YU, Purdue University						
0930 hrs AIAA-2020-0653 **In-situ Measurement of Resin Shrinkage with Respect to Degree of Cure** S. Motagi, S. Namilae, T. Freeman, S. Boetcher, Embry-Riddle Aeronautical University, Daytona Beach, FL	1000 hrs AIAA-2020-0654 **Predictive Multiscale Modeling of 3D Printed Polymers for Enhanced Fracture Performance** J. Li, University of Massachusetts, Dartmouth, Dartmouth, MA	1030 hrs AIAA-2020-0655 **Integrated Computational Modeling for Efficient Material and Process Design for Composite Aerospace Structures** R. D'Mello, A. Waas, University of Michigan, Ann Arbor, Ann Arbor, MI; M. Maiaru, University of Massachusetts, Lowell, Lowell, MA; R. Koon, Lockheed Martin Corporation, Marietta, GA				

Tuesday, 7 January 2020						
176-INPSI-2	**Special Session: Supersonic Inlets - Honoring the Legacy of Jon Tinapple II**					**Silver Spring I**
Chaired by: E. LOTH, University of Virginia and S. OCHS, United Technologies Research Center						
0930 hrs Oral Presentation **High Speed Aerodynamics at AFOSR (Invited)** I. Leyva, Air Force Research Laboratory, Edwards AFB, CA	1000 hrs Oral Presentation **High-Speed Inlet Research at NASA Glenn (Invited)** M. Long-Davies, NASA Glenn Research Center, Cleveland, OH	1030 hrs Oral Presentation **Computational Tools for Supersonic Inlet Design and Analysis (Invited)** J. Slater, NASA Glenn Research Center, Cleveland, OH	1100 hrs Oral Presentation **Design Procedures and Development of Research Model Requirements for a Mach 3 Two-Dimensional Supersonic Inlet (Invited)** L. Weir, Universal Technology Corporation, Dayton, OH	1130 hrs Oral Presentation **XB-1 Supersonic Inlet Design: Concorde-Class Performance in Nine Months (Invited)** C. Clifton, Boom Supersonic, Dove Valley, CO	1200 hrs Oral Presentation **Micro-Vortex Generators in Supersonic Inlets (Invited)** H. Babinsky, University of Cambridge, Cambridge, United Kingdom	

Tuesday, 7 January 2020						
177-IS-5	**Autonomy - Tasking and Scheduling**					**Celebration 10**
Chaired by: A. CHAKRABARTY						
0930 hrs AIAA-2020-0656 **Fast Planning for Joint Routing and Charging of Autonomous Drone Delivery System** J. Chen, San Diego State University, San Diego, CA	1000 hrs AIAA-2020-0657 **Decentralized Weapon Target Assignment Against High-Speed Enemy Missiles** J. Kim, W. Lee, Korea Advanced Institute of Science and Technology, Daejeon, South Korea; D. Cho, Samsung, Hwaseong, South Korea; J. Song, TWINNY Robotics Lab, Daejeon, South Korea; H. Choi, Korea Advanced Institute of Science and Technology, Daejeon, South Korea	1030 hrs AIAA-2020-0658 **Distributed Recursive Hungarian-based Approaches to Fast Task Allocation for Unmanned Aircraft Systems** A. Samiei, L. Sun, New Mexico State University, Las Cruces, NM	1100 hrs AIAA-2020-0659 **Monte Carlo Tree Search Methods for Telescope Tasking** S. Fedeler, M. Holzinger, University of Colorado, Boulder, Boulder, CO	1130 hrs AIAA-2020-0660 **An Efficient Algorithm for Self-Organized Terminal Arrival in Urban Air Mobility** J. Bertram, P. Wei, Iowa State University, Ames, IA	1200 hrs AIAA-2020-0661 **Risk-aware Multi-robot Collaboration with Arrival Deadlines in Uncertain Environments** F. Tao, J. Votion, Y. Cao, University of Texas, San Antonio, San Antonio, TX	

Tuesday, 7 January 2020						
178-MDO-5	**Application of MDO for Vehicle Design**					**Celebration 2**
Chaired by: J. HWANG and B. MESMER, University of Alabama in Huntsville						
0930 hrs AIAA-2020-0662 **On the Structural Design Synthesis of Aircraft Engine Pylons at a Certification Level of Detail** M. Stefanovic, The Boeing Company, Everett, WA; E. Livne, University of Washington, Seattle, Seattle, WA	1000 hrs AIAA-2020-0663 **Fuel Weight Minimization for Large N+3 Composite Transports with Multiple Control Surfaces** W. Zhao, R. Gupta, R. Kapania, Virginia Polytechnic Institute and State University, Blacksburg, VA; D. Schmidt, D.K. Schmidt and Associates, Monument, CO	1030 hrs AIAA-2020-0664 **Multidisciplinary Design Optimization of Low-Boom Supersonic Aircraft with Mission Constraints** W. Li, K. Geiselhart, NASA Langley Research Center, Hampton, VA	1100 hrs AIAA-2020-0665 **System Analyzer for a Bioinspired Mars Flight Vehicle System for Varying Mission Contexts** S. Dunne, G. Palma, J. Pohly, B. Mesmer, D. Landrum, C. Kang, University of Alabama, Huntsville, Huntsville, AL			

Tuesday, 7 January 2020						
179-MST-4	**Augmented and Virtual Reality Technologies III - Cognitive Assistance (Invited)**					**Bayhill 30**
Chaired by: D. POOL, Delft University of Technology and P. ZAAL, NASA Ames Research Center						
0930 hrs AIAA-2020-0666 **GPV: HMD Symbology for Terrain Following in DVE (Invited)** Y. Sugihara, K. Ohga, K. Funabiki, Japan Aerospace Exploration Agency (JAXA), Tokyo, Japan; K. Tawada, Shimadzu Corporation, Kyoto, Japan	1000 hrs AIAA-2020-0667 **Design and Evaluation of a Constraint-Based Head-Up Display for Helicopter Obstacle Avoidance During Forward Flight (Invited)** D. Friesen, M. Pavel, C. Borst, O. Stroosma, Delft University of Technology, Delft, The Netherlands; P. Masarati, Technical University of Milan, Milan, Italy; M. Mulder, Delft University of Technology, Delft, The Netherlands	1030 hrs AIAA-2020-0668 **A Mixed Reality Simulation Tool for In-Flight Evaluations (Invited)** D. Klyde, J. Gray, G. Park, Systems Technology, Inc., Hawthorne, CA	1100 hrs AIAA-2020-0669 **Operational Evaluation of a Virtual Reality Parachute Simulator (Invited)** C. Liang, R. Lascink, D. Klyde, Systems Technology, Inc., Hawthorne, CA	1130 hrs **Open Discussion**		

Tuesday, 7 January 2020						
180-MST-5/SOF-3	**Modeling- and Simulation-Based Software Development and Verification I (Invited)**					**Coral Spring II**
Chaired by: C. TORENS, DLR - German Aerospace Center and U. DURAK, DLR-German Aerospace Center						
0930 hrs Oral Presentation **The Synergy of Simulation and Runtime Monitoring for Verification and Validation (Invited)** C. Torens, U. Durak, German Aerospace Center (DLR), Braunschweig, Germany	1000 hrs AIAA-2020-0670 **Simulation Based Development and Verification of Drogue Detection Algorithms for Autonomous Air to Air Refuelling (Invited)** O. Ellis, Clausthal University of Technology, Clausthal-Zellerfeld, Germany	1030 hrs AIAA-2020-0671 **MontiBelle - Toolbox for a Model-Based Development and Verification of Distributed Critical Systems for Compliance with Functional Safety (Invited)** H. Kausch, M. Pfeiffer, D. Raco, B. Rumpe, RWTH Aachen University, Aachen, Germany	1100 hrs **Open Discussion**			

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181-MVCE-2	Geometry and Meshing Applications					Bayhill 20
Chaired by: S. DEY, US NRL and C. WOEBER, Pointwise, Inc.						
0930 hrs AIAA-2020-0672 **Unstructured Grid Development for the Space Launch System Liftoff and Transition Lineloads Computational Analysis** N. Ratnayake, S. Krist, F. Ghaffari, V. Ahmed, NASA Langley Research Center, Hampton, VA	1000 hrs AIAA-2020-0673 **Sketch-to-Solution: A Case Study in RCS Aerodynamic Interaction** W. Kleb, M. Schoenenberger, A. Korzun, M. Park, NASA Langley Research Center, Hampton, VA	1030 hrs AIAA-2020-0674 **Evaluation of Flight Parameters During Approach and Landing Phases by Applying Principal Component Analysis** S. Jasra, G. Valentino, University of Malta, Msida, Malta; A. Muscat, QuAero, Mosta, Malta; D. Zammit-Mangion, R. Camilleri, University of Malta, Msida, Malta	1100 hrs AIAA-2020-0675 **Verification of Anisotropic Mesh Adaptation for Complex Aerospace Applications** A. Balan, M. Park, S. Wood, W. Anderson, NASA Langley Research Center, Hampton, VA			

Tuesday, 7 January 2020

182-NDA-4	Surrogate Modeling for Uncertainty Quantification					Celebration 3
Chaired by: T. WEST, NASA Langley Research Center and G. GERACI, Sandia National Laboratories						
0930 hrs AIAA-2020-0676 **Optimization of Information Gain in Multi-Fidelity High-Speed Pressure Predictions** W. Sisson, S. Mahadevan, Vanderbilt University, Nashville, TN; B. Smarslok, Air Force Research Laboratory, Wright-Patterson AFB, OH	1000 hrs AIAA-2020-0677 **Multi-Fidelity, Gradient-enhanced, and Locally Optimized Sparse Polynomial Chaos and Kriging Surrogate Models Applied to Benchmark Problems** M. Rumpfkeil, University of Dayton, Dayton, OH; P. Beran, Air Force Research Laboratory, Wright-Patterson AFB, OH	1030 hrs AIAA-2020-0678 **Remarks for Scaling Up a General Gaussian Process to Model Large Dataset with Sub-models** Y. Zhang, J. Kristensen, W. Subber, S. Ghosh, G. Khan, L. Wang, General Electric Company, Schenectady, NY	1100 hrs AIAA-2020-0679 **Applications of Intelligent Experimental Design for Additive Manufacturing** N. Chennimalai Kumar, Y. Zhang, V. Gupta, V. Dheeradhada, L. Dial, G. Khan, General Electric Company, Niskayuna, NY; et al.	1130 hrs AIAA-2020-0680 **Uncertainty quantification of fatigue properties with sparse data using hierarchical Bayesian model** J. Chen, Y. Liu, Arizona State University, Tempe, AZ	1200 hrs AIAA-2020-0681 **Comparison of Surrogate Modeling Methods for Finite Element Analysis of Landing Gear Loads** J. Hoole, P. Sartor, J. Booker, J. Cooper, University of Bristol, Bristol, United Kingdom; X. Gogouvitis, Safran Group, Gloucester, United Kingdom; R. Schmidt, Safran Group, Ajax, Canada	

Tuesday, 7 January 2020

183-PDL-5	Aero-Optics					Bayhill 19
Chaired by: M. RENNIE, University of Notre Dame and M. WHITE, Air Force Research Laboratory						
0930 hrs AIAA-2020-0682 **Turbulence Profiling Using AAOL-BC** M. Kalensky, E. Jumper, University of Notre Dame, Notre Dame, IN; M. Whiteley, Y. Diskin, MZA Associates Corporation, Dayton, OH; S. Gordeyev, University of Notre Dame, Notre Dame, IN; R. Drye, MZA Associates Corporation, Dayton, OH; et al.	1000 hrs AIAA-2020-0683 **Filtering of Acoustic Disturbances from Aero-Optical Measurements** B. Catron, M. Rennie, S. Gordeyev, E. Jumper, University of Notre Dame, Notre Dame, IN	1030 hrs AIAA-2020-0684 **Analytical Approach for Aero-Optical & Atmospheric Effects in Supersonic Flow Fields** A. Gupta, B. Argrow, University of Colorado, Boulder, Boulder, CO	1100 hrs AIAA-2020-0685 **Wake Response Downstream of Spanwise-Oscillating Hemispherical Turret** A. Roeder, S. Gordeyev, University of Notre Dame, Notre Dame, IN; D. Wittich, Air Force Research Laboratory, Kirtland AFB, NM	1130 hrs AIAA-2020-0686 **3D Analysis of Plasma Flows by Light Field Deconvolution** M. Eberhart, S. Loehle, University of Stuttgart, Stuttgart, Germany		

Tuesday, 7 January 2020

184-PGC-4	Pressure Gain Combustion: Rotating Detonation Rocket Engines II					Manatee Spring I
Chaired by: E. PAULSON, Air Force Research Laboratory and M. BOHON						
0930 hrs AIAA-2020-0687 **Numerical investigation of operational performance in a methane-oxygen rotating detonation rocket engine** C. Lietz, Sierra Lobo, Inc., Edwards AFB, CA; M. Ross, University of California, Los Angeles, Los Angeles, CA; Y. Desai, HyPerComp, Inc., Westlake Village, CA; W. Hargus, Air Force Research Laboratory, Edwards AFB, CA	1000 hrs AIAA-2020-0688 **Three-Dimensional Numerical Simulation on Hydrogen/Air Rotating Detonation Engine with Aerospike Nozzle: Effects of Nozzle Geometries** N. Kurita, N. Jourdaine, N. Tsuboi, K. Ozawa, Kyushu Institute of Technology, Fukuoka, Japan; K. Hayashi, Aoyama Gakuin University, Kanagawa, Japan; T. Kojima, Japan Aerospace Exploration Agency (JAXA), Tokyo, Japan	1030 hrs AIAA-2020-0689 **High Fidelity Simulations of a Methane-Oxygen Rotating Detonation Rocket Engine** S. Prakash, V. Raman, University of Michigan, Ann Arbor, Ann Arbor, MI; C. Lietz, Sierra Lobo, Inc., Edwards AFB, CA; W. Hargus, S. Schumaker, Air Force Research Laboratory, Edwards AFB, CA				

Tuesday, 7 January 2020						
185-SCS-3	**High Strain Composite Materials and Structures**					**Celebration 12**
Chaired by: J. BLACK, Virginia Tech and J. HEALD, Canadian Space Agency						
0930 hrs AIAA-2020-0690 **Sequentially Controlled Dynamic Deployment of Ultra-Thin Shell Structures** A. Pedivellano, E. Gdoutos, S. Pellegrino, California Institute of Technology, Pasadena, CA	1000 hrs AIAA-2020-0691 **Shear stiffening in the microbuckling of fiber composites** G. De Luca, F. Lopez Jimenez, University of Colorado, Boulder, Boulder, CO	1030 hrs AIAA-2020-0692 **Ultralight Deployable Space Structure Prototype** E. Gdoutos, A. Truong, A. Pedivellano, F. Royer, S. Pellegrino, California Institute of Technology, Pasadena, CA	1100 hrs AIAA-2020-0693 **Modeling of Viscoelasticity in Thin Flexible Composites using Coincident Element Method** T. Rose, J. Calish, Roccar, LLC, Longmont, CO; F. Lopez Jimenez, University of Colorado, Boulder, Boulder, CO	1130 hrs AIAA-2020-0694 **Interface Failure Analysis of Triangular Rollable and Collapsible (TRAC) Booms** A. Hasanyan, C. Leclerc, S. Pellegrino, California Institute of Technology, Pasadena, CA		

Tuesday, 7 January 2020						
186-SD-5	**Structural Dynamics of Beams and Plates**					**Celebration 15**
Chaired by: D. GRIFFITH, University of Texas at Dallas and S. SMITH, University of Kentucky						
0930 hrs AIAA-2020-0695 **Buckling and Vibrations of Periodically Supported Non-Prismatic Columns using an Integral Equation Approach** J. Miglani, R. Kapania, Virginia Polytechnic Institute and State University, Blacksburg, VA	1000 hrs AIAA-2020-0696 **Free Vibration of Thick Laminated Quadrilateral Plates Using TSNDT** B. Alanbay, R. Kapania, R. Batra, Virginia Polytechnic Institute and State University, Blacksburg, VA	1030 hrs AIAA-2020-0697 **A Beam-Tendon System with an Eccentrically Mounted Tendon: Parametric Studies** V. Ondra, B. Titurus, B. Woods, University of Bristol, Bristol, United Kingdom	1100 hrs AIAA-2020-0698 **Isogeometric Free Vibration Analysis of Multilayered Composite Plates in Hygrothermal Environment** S. Verma, B. Thakur , B. Singh, D. Maiti, Indian Institute of Technology Kharagpur, Kharagpur, India	1130 hrs AIAA-2020-0699 **Dynamic Analysis of Folded Laminated Composite Plate Using Nonpolynomial Shear Deformation Theory** B. Thakur , S. Verma, B. Singh, D. Maiti, Indian Institute of Technology Kharagpur, Kharagpur, India	1200 hrs AIAA-2020-0700 **Modeling nonlinear unsteady aeroelastic characteristics of cantilevered beams with piezoelectric coupling** C. Santos, University of São Paulo, São Carlos, Brazil; D. Pacheco, Graz University of Technology, Graz, Austria; M. Zakaria, Military Technical College, Cairo, Egypt; H. Taha, University of California, Irvine, Irvine, CA	

Tuesday, 7 January 2020						
187-SD-6	**Structural Health Monitoring and Prognosis**					**Celebration 1**
Chaired by: S. RAGHAVAN, University of Central Florida and J. SILLS, NASA						
0930 hrs AIAA-2020-0701 **Health Monitoring of Aerospace Structures via Dynamic Strain Measurements: An Experimental Demonstration** B. Martins, J. Kosmatka, University of California, San Diego, La Jolla, CA	1000 hrs AIAA-2020-0702 **On the Application of a Long-Short-Term Memory Deep Learning Architecture for Aircraft Transonic Buffet Loads Monitoring** M. Candon, M. Esposito, RMIT University, Melbourne, Australia; O. Levinski, Department of Defence, Melbourne, Australia; N. Joseph, S. Koschel, R. Carrese, RMIT University, Melbourne, Australia; et al.	1030 hrs AIAA-2020-0703 **Peak Finding within Spectral Data from an Aircraft T-Tail using a Black-Box Variational Bayesian Approach** P. Cheema, G. Vio, University of Sydney, Sydney, Australia				

Tuesday, 7 January 2020						
188-SE-3	**Systems Engineering III**					**Celebration 13**
Chaired by: M. WHEATON, The Aerospace Corporation and M. FRENCH, Rolls-Royce Corp						
0930 hrs AIAA-2020-0704 **An Integrated Product and Process Development Method Conceptual Design for a Safety Driven Design Process for a Proposed NASA Lunar Modular Habitat with Autonomous Operation** M. Alves-Lacerda, D. Park, Georgia Institute of Technology, Atlanta, GA	1000 hrs AIAA-2020-0705 **Conducting Pugh Method-based Trade Studies during Product Development: The case of evaluating Turbofan versus Turboprop versus Piston Engine Alternatives for UAVs** K. Wurthmann, Nova Southeastern University, Fort Lauderdale, FL	1030 hrs AIAA-2020-0706 **A Review of System Failure Classification Schemes** C. Eaton, A. Banks, B. Mesmer, K. Weger, University of Alabama, Huntsville, Huntsville, AL	1100 hrs AIAA-2020-0707 **Factors that Influence the Acceptance of New Aerospace Risk Assessment Techniques** M. Cummings, Duke University, Durham, NC	1130 hrs AIAA-2020-0708 **On the Evaluation of Decision Criteria in Engineering Decision Making under Uncertainty** C. White, B. Mesmer, University of Alabama, Huntsville, Huntsville, AL	1200 hrs AIAA-2020-0709 **Application of Risk Informed Decision Making to a Highly Reliable Three Dimensionally Woven Thermal Protection System for Mars Sample Return** J. Needels, P. Gage, Neerim Corporation, Moffett Field, CA; D. Ellerby, E. Venkatapathy, K. Peterson, J. Vander Kam, NASA Ames Research Center, Moffett Field, CA	

Tuesday, 7 January 2020						
189-SEN-1	**Novel Sensors**					**Celebration 8**
Chaired by: T. HOWARD, University of New Mexico						
0930 hrs AIAA-2020-0710 **Embedded Fiber Optic Sensors for Multi-Parameter Fluid Measurements** A. Boulanger, D. Kominsky, Luna Innovations, Inc., Blacksburg, VA; A. Hehr, Fabrisonic, LLC, Columbus, OH; P. Hebert, NASA Stennis Space Center, Stennis Space Center, MS	1000 hrs AIAA-2020-0711 **Aspects of Quantum Sensing for Aerospace Systems** T. Howard, University of New Mexico, Albuquerque, Albuquerque, NM	1030 hrs AIAA-2020-0712 **Flow Testing of a Sonic Anemometer for the Martian Environment** R. White, Tufts University, Medford, MA; I. Neeson, VN Instruments, Elizabethtown, Canada; E. Schmid, Tufts University, Medford, MA; J. Merrison, J. Iversen, Aarhus University, Aarhus, Denmark; D. Banfield, Cornell University, Ithaca, NY	1100 hrs AIAA-2020-0713 **Analysis of a Whispering Gallery Mode Based Displacement Sensor** N. Agarwal, D. Zittlow, E. Rubino, University of Wisconsin, Platteville, Platteville, WI		

Tuesday, 7 January 2020						
190-SFM-7	**Dynamics and Control of Large Space Structures and Tethers**					**Bayhill 28**
Chaired by: D. KIM, University of Cincinnati						
0930 hrs AIAA-2020-0714 **Magnetic Attitude Control of Gossamer Spacecraft using a 3D-printed, Electrically Conducting Support Structure** B. Robb, M. McRobb, C. McInnes, University of Glasgow, Glasgow, United Kingdom	1000 hrs AIAA-2020-0715 **Dynamic Analysis of Deployment of Electric Solar Wind Sail** Z. Zhu, G. Li, York University, Toronto, Canada	1030 hrs AIAA-2020-0716 **Attitude Control of a Spacecraft Flexible Appendage using Parallel Feedforward Control** R. Halverson, R. Caverly, University of Minnesota, Twin Cities, Minneapolis, MN	1100 hrs AIAA-2020-0717 **Output Space Mapping for Net-Based Debris Capture** N. Ravichandra, E. Botta, State University of New York, Buffalo, NY	1130 hrs AIAA-2020-0718 **Vibration Modes of a Barbell Electric Sail** M. Simmons, C. Montalvo, University of South Alabama, Mobile, AL	1200 hrs AIAA-2020-0719 **Validating the Deployment of a Novel Tether Design for Net-Based Orbital Debris Removal Missions** K. Stadnyk, S. Ulrich, Carleton University, Ottawa, Canada	

Tuesday, 7 January 2020						
191-SFM-9	**Space Situational Awareness, Conjunction Analysis, and Collision Avoidance II**					**Bayhill 27**
Chaired by: B. GUNTER, Georgia Institute of Technology						
0930 hrs AIAA-2020-0720 **Optimization Strategies for Myopic and Forecasted Divergence-Based Sensor Tasking Objectives** M. Gualdoni, K. DeMars, Missouri University of Science and Technology, Rolla, MO	1000 hrs AIAA-2020-0721 **Low Earth Orbit Slotting for Space Traffic Management Using Flower Constellation Theory** D. Arnas, M. Lifson, R. Linares, Massachusetts Institute of Technology, Cambridge, MA; M. Avenda, University of Zaragoza, Zaragoza, Spain	1030 hrs AIAA-2020-0722 **Attitude Perturbation Detection Through Ground-Based Photometric Data** Z. Henry, Embry-Riddle Aeronautical University, Daytona Beach, FL; B. Udrea, VisSidus Technologies, Inc., Kihei, HI; G. Fox, Booz Allen Hamilton, Utica, NY; S. Naderi, T. Swindle, Air Force Research Laboratory, Kihei, HI; C. Shaw, University of Hawaii, Manoa, Manoa, HI				

Tuesday, 7 January 2020						
192-STR-6	**Testing and Analysis of Impact Damage**					**Celebration 5**
Chaired by: A. PALAZOTTO and P. DAVIDSON, University of Michigan						
0930 hrs AIAA-2020-0723 **Challenges of generating controlled one-inch impact damage in thick CFRP composites** R. James, H. Mei, M. Haider, V. Giurgiutiu, University of South Carolina, Columbia, Columbia, SC	1000 hrs AIAA-2020-0724 **Experimental and High-fidelity Computational Investigations on the Low Velocity Impact Damage of Laminated Composite Materials** S. Lin, A. Waas, University of Michigan, Ann Arbor, Ann Arbor, MI	1030 hrs AIAA-2020-0725 **Implementation of a Neo-Hookean Material Model in State-Based Peridynamics to Represent Nylon Bead Behavior during High-Speed Impact** R. Waxman, I. Guven, Virginia Commonwealth University, Richmond, VA	1100 hrs AIAA-2020-0726 **Mechanics-Based Modeling Approach for Rapid Prediction of Low Velocity Impact Damage in Composite Laminates** L. Borkowski, R. Kumar, United Technologies Corporation, East Hartford, CT; U. Palliyaguru, Wichita State University, Wichita, KS	1130 hrs AIAA-2020-0727 **BVID analysis of non-crimp fabric cross-ply laminate manufactured through wet compression molding process** S. Lee, C. Hong, T. Choi, H. Kim, W. Ji, Ulsan National Institute of Science and Technology (UNIST), Ulsan, South Korea		

Tuesday, 7 January 2020

193-SUR-1	Survivability - Orbital Debris Issues					Celebration 14
Chaired by: S. BROUSSARD, The Boeing Company and M. SCHUCK, SURVICE Engineering Company						
0930 hrs AIAA-2020-0728 **Some Thoughts on Satisfying Spacecraft Passivation Requirements** W. Schonberg, Missouri University of Science and Technology, Rolla, MO	1000 hrs AIAA-2020-0729 **Hypervelocity Impact Vulnerability Assessment for a 6U CubeSat Bus** J. Hess, Air Force Institute of Technology, Wright-Patterson AFB, OH	1030 hrs AIAA-2020-0730 **Fractionated Spacecraft Survivability following a Catastrophic Explosion** J. Hess, Air Force Institute of Technology, Wright-Patterson AFB, OH	1100 hrs AIAA-2020-0731 **Venus Sample Return Mission Concept Development** K. Carpenter, S. Basinait, J. Bilello, J. Bayandor, State University of New York, Buffalo, NY			

Tuesday, 7 January 2020

194-TP-3	Spectroscopy and Radiation					Plaza Ballroom E
Chaired by: P. YEE, The Aerospace Corporation and R. FU, University of Kentucky						
0930 hrs AIAA-2020-0732 **VUV radiation of high temperature CO_2/Ar plasmas** S. McGuire, A. Tibère-Inglesse, P. Mariotto, CentraleSupélec, Gif-sur-Yvette, France; B. Cruden, Analytical Mechanics Associates, Inc., Moffett Field, CA; C. Laux, CentraleSupélec, Gif-sur-Yvette, France	1000 hrs AIAA-2020-0733 **MHz mid-infrared laser absorption sensor for carbon monoxide and temperature behind detonation waves** A. Nair, C. Jelloian, D. Morrow, F. Bendana, D. Pineda, R. Spearrin, University of California, Los Angeles, Los Angeles, CA	1030 hrs Oral Presentation **Space-Angle Discontinuous Galerkin Method for One-Dimensional Cylindrical Radiative Transfer Equation** H. Wang, R. Abedi, University of Tennessee, Tullahoma, Tullahoma, TN; S. Mudaliar, Air Force Research Laboratory, Wright-Patterson AFB, OH	1100 hrs AIAA-2020-0734 **Modeling Requirements for Accurate Prediction of Radiative Transfer in Particle Laden Flow** K. Hansson, I. Boyd, University of Michigan, Ann Arbor, Ann Arbor, MI	1130 hrs AIAA-2020-0735 **Analysis of Three Multi-Band Models for Radiative Heat Transfer in LTE Air Plasma** S. Fraile Izquierdo, J. Meurisse, S. Visser, M. Haw, J. Schulz, N. Mansour, NASA Ames Research Center, Moffett Field, CA		

Tuesday, 7 January 2020

195-UAS-3	Unmanned Aircraft System: Design, Safety, and Human-Machine Interfaces II					Celebration 16
Chaired by: M. ANDERSON						
0930 hrs AIAA-2020-0736 **Vocal Intent Programmability for UAS in Disaster Scenarios** W. Muhammad, F. Esposito, S. Rajashekar, S. Gururajan, Saint Louis University, St. Louis, MO	1000 hrs AIAA-2020-0737 **Reconfigurable swarms and multi-user, cooperative UAS flights through a virtual reality interface** S. Rajashekar, S. Gururajan, F. Esposito, D. Ferry, Saint Louis University, St. Louis, MO	1030 hrs AIAA-2020-0738 **Conflict Probability Estimation Using a Risk-Based Dynamic Anisotropic Operational Safety Bound for UAV Traffic Management** J. Hu, Arizona State University, Tempe, AZ; H. Erzberger, NASA Ames Research Center, Moffett Field, CA; K. Goebel, Parc, Palo Alto, CA; Y. Liu, Arizona State University, Tempe, AZ	1100 hrs AIAA-2020-0739 **Reliability Analysis for Small Unmanned Air Vehicle with Algorithmic Redundancy** A. Kotikalpudi, B. Danowsky, Systems Technology, Inc., Hawthorne, CA; P. Seiler, University of Minnesota, Twin Cities, Minneapolis, MN	1130 hrs AIAA-2020-0740 **Fit2Fly: A Proof of Concept for Testing the Commericial Feasibility of Unmanned Aerial System Operations** R. Bonk, R. Bowers, S. Buckner, C. Byrd, H. Crayton, K. Tam, NASA Langley Research Center, Hampton, VA; et al.	1200 hrs AIAA-2020-0741 **Representative Small UAS Trajectories for Encounter Modeling** A. Weinert, M. Edwards, L. Alvarez, Lincoln Laboratory, Massachusetts Institute of Technology, Lexington, MA; S. Michelle Katz, Stanford University, Stanford, CA	

Tuesday, 7 January 2020

196-WE-3 0930 - 1130 hrs	Wind Energy Lecture	Plaza Ballroom G
Offshore Wind Development - Today and Tomorrow **Lorry Wagner** Principal Holt / Murphy Advisors, Ltd		

Tuesday, 7 January 2020

197-LUNCH-2 1230 - 1400 hrs	Networking Lunch - Taco Tuesday!	Garden Terrace
This lunch is located in the Garden Terrace which is on the 4th floor.		

Tuesday, 7 January 2020

198-HUB-1 1330 - 1400 hrs	2020 AVIATION Forum: We get you Here, There and Now Everywhere	the HUB
Hear about current activities, planning, and programming for the upcoming AVIATION Forum in Reno, NV. Offer your feedback and ideas.		

Tuesday, 7 January 2020

199-HUB-2 1400 - 1500 hrs	Unmanned Aircraft for Scientific Exploration of Extreme Environments	the HUB

Unmanned Aircraft Systems have revolutionized our ability to make in-situ measurements that would otherwise be impossible from the ground or impractical from manned aircraft. At the University of Colorado Boulder's Ann and H.J. Smead Department of Aerospace Engineering Sciences, the Integrated Remote and In-Situ Sensing (IRISS) initiative has developed a 3rd generation unmanned aircraft system for the research in extreme environments such as near tornadic supercell thunderstorms, in heavy rain and hail, and the Arctic. We will present the success of this system in extreme weather and discuss the modular design approach that enables robust and rapid adaptability for a variety of in-situ measurements.

Tuesday, 7 January 2020

200-AA-4	Jet Noise III					Peacock Spring

Chaired by: P. MORRIS and T. SUZUKI, The Boeing Company

1430 hrs AIAA-2020-0742 **Extraction of Large-Scale Coherent Structures from Large Eddy Simulation of Supersonic Jets for Shock-Associated Noise Prediction** W. Shen, T. Patel, S. Miller, University of Florida, Gainesville, Gainesville, FL	1500 hrs AIAA-2020-0743 **Acoustic Radiation from Instability Waves within Supersonic Jets Obtained via Theory and Large-Eddy Simulation** J. Cheng, W. Shen, S. Miller, University of Florida, Gainesville, Gainesville, FL	1530 hrs AIAA-2020-0744 **Sensitivity Analysis of Broadband Shock-Associated Noise based on Navier-Stokes Equations Decomposition** T. Patel, S. Miller, University of Florida, Gainesville, Gainesville, FL	1600 hrs AIAA-2020-0745 **Modal Analysis of the Directivity of Acoustic Emissions from Wavepackets in Turbulent Jets** A. Nekkanti, O. Schmidt, University of California, San Diego, La Jolla, CA	1630 hrs AIAA-2020-0746 **Effect of an Adjacent Flat Plate on a Highly-Heated Rectangular Supersonic Jet** S. Chen, Royal Institute of Technology (KTH), Stockholm, Sweden; R. Gojon, Higher Institute of Aeronautics and Space, Toulouse, France; M. Mihaescu, Royal Institute of Technology (KTH), Stockholm, Sweden	1700 hrs AIAA-2020-0747 **Numerical Evaluation of Noise Sources and Statistics from High-Speed Two-Phase Jet Flow** W. Wang, S. Balachandar, S. Miller, University of Florida, Gainesville, Gainesville, FL	

Tuesday, 7 January 2020

201-ACD-8	Aircraft Operations and Performance					Orlando Ballroom L

Chaired by: T. TAKAHASHI, Arizona State University and M. ORR, Boeing Commercial Airplanes

1430 hrs AIAA-2020-0748 **Aircraft En-Route Performance Considering Winds-Aloft** P. Thomas, T. Takahashi, Arizona State University, Tempe, AZ	1500 hrs AIAA-2020-0749 **On the Operational Implications of Traditional Design Rules for Minimum Controllable Airspeed** T. Takahashi, Arizona State University, Tempe, AZ; R. Perez, Royal Military College of Canada, Kingston, Canada	1530 hrs AIAA-2020-0750 **Commercial Aircraft Value Evaluation and Sensitivity Analysis from the Perspective of Chinese Airlines** C. Chen, COMAC Shanghai Aircraft Design and Research Institute, Shanghai, China	1600 hrs AIAA-2020-0751 **Influence of Commercial Aircraft Interior Configuration in Boarding Time** D. Oliveira, J. Coelho, A. Moraes, Technological Institute of Aeronautics (ITA), São José dos Campos, Brazil	1630 hrs AIAA-2020-0752 **Busemann-Sears-Haack Hybrid Geometries Applied Toward Supersonic Commercial Vehicles for Improved Wave Drag Performance** A. Sklar, Z. Rusak, Rensselaer Polytechnic Institute, Troy, NY	1700 hrs AIAA-2020-0753 **Hybrid Aircraft for Improved Off-Design Performance and Reduced Emissions** G. Atanasov, D. Silberhorn, German Aerospace Center (DLR), Hamburg, Germany	

Tuesday, 7 January 2020

202-AFM-6	Flight Dynamics Modeling					Bayhill 18

Chaired by: D. MURRI, NASA Engineering and Safety Center and A. DWYER-CIANCIOLO, NASA Langley Research Center

1430 hrs AIAA-2020-0754 **Directivity Functions during Aircraft Maneuvering** J. Nix, R. Lind, University of Florida, Gainesville, Gainesville, FL	1500 hrs AIAA-2020-0755 **Simulation of Flexible Aircraft Response to Gust and Turbulence for Flight Dynamics Investigations** P. Castells Marin, C. Poetsch, Airbus, Toulouse, France	1530 hrs AIAA-2020-0756 **ASPIRE Parachute Modeling and Comparison to Post-Flight Reconstruction** S. Dutta, NASA Langley Research Center, Hampton, VA	1600 hrs AIAA-2020-0757 **Estimations of Atmospheric Turbulent Properties in Various Altitude Regions and Climatological Conditions** H. Takahashi, M. Kanamori, Y. Naka, Y. Makino, Japan Aerospace Exploration Agency (JAXA), Kakuda, Japan	1630 hrs AIAA-2020-0758 **Drag and Heat Transfer Effects on Hypersonic Vehicles in Close-Proximity Flight** D. Riggins, Missouri University of Science and Technology, Rolla, MO; J. Camberos, Air Force Research Laboratory, Wright-Patterson AFB, OH	1700 hrs AIAA-2020-0759 **Entropy-Based Performance Analysis of Chemical Rockets** M. Abbas, D. Riggins, Missouri University of Science and Technology, Rolla, MO; M. Watson, NASA Marshall Space Flight Center, Huntsville, AL	

Tuesday, 7 January 2020

203-AFM-7	Learn-to-Fly Technology Status					Bayhill 19

Chaired by: R. WEINSTEIN and V. AUBUCHON

1430 hrs AIAA-2020-0760 **An Overview of NASA's Learn-to-Fly Technology Development** S. Riddick, NASA Langley Research Center, Hampton, VA	1500 hrs AIAA-2020-0761 **Autonomous Real-Time Global Aerodynamic Modeling in the Frequency Domain** E. Morelli, NASA Langley Research Center, Hampton, VA	1530 hrs AIAA-2020-0762 **Global Aerodynamic Modeling Using Automated Local Model Networks in Real Time** R. Weinstein, NASA Langley Research Center, Hampton, VA; J. Hubbard, Texas A&M University, College Station, TX	1600 hrs AIAA-2020-0763 **Autopilot Design with Learn-to-Fly** S. Snyder, NASA Langley Research Center, Hampton, VA	1630 hrs AIAA-2020-0764 **Preliminary Steps in Developing Rapid Aero Modeling Technology** P. Murphy, E. Viken, R. Weinstein, V. Aubuchon, R. Busan, D. Hatke, NASA Langley Research Center, Hampton, VA; et al.	1700 hrs AIAA-2020-0765 **On the Development of a Fuzzy Logic Model-less Aircraft Controller** C. Scott, O. Gonzalez, Old Dominion University, Norfolk, VA	

Tuesday, 7 January 2020

204-AMT-8 1430 - 1730 hrs	Pressure Sensitive Paint Workshop	Bayhill 23

Tuesday, 7 January 2020

205-AMT-9 — Spectroscopic Techniques III — Bayhill 24

Chaired by: J. WAGNER, Sandia National Laboratories and A. CUTLER, The George Washington University

1430 hrs	1500 hrs	1530 hrs	1600 hrs	1630 hrs		
AIAA-2020-0766 **Development of Chirped-Probe-Pulse Femtosecond CARS Technique for CO_2** M. Gu, A. Satija, R. Lucht, Purdue University, West Lafayette, IN	AIAA-2020-0767 **Time-resolved measurements of key intermediate products during cyclopentanone pyrolysis in a shock tube** E. Ninnemann, A. Laich, J. Baker, R. Greene, S. Vasu, University of Central Florida, Orlando, FL	AIAA-2020-0768 **DIMP Pyrolysis at High Temperatures Behind Reflected Shock Waves** J. Baker, R. Rahman, E. Ninnemann, S. Neupane, S. Barak, S. Vasu, University of Central Florida, Orlando, FL	AIAA-2020-0769 **Imaging of propellant flame structure with femtosecond two-photon laser-induced fluorescence of CN** K. Zhu, S. Barkley, A. LoCurto, T. Sippel, J. Michael, Iowa State University, Ames, IA	AIAA-2020-0770 **Simultaneous Temperature/Pressure Monitoring in Compressible Flows using Hybrid fs/ps Pure-Rotational CARS** S. Kearney, D. Richardson, J. Retter, Sandia National Laboratories, Albuquerque, NM; C. Dedic, University of Virginia, Charlottesville, Charlottesville, VA; P. Danehy, NASA Langley Research Center, Hampton, VA		

Tuesday, 7 January 2020

206-APA-15 — Special Session: Rotor-in-Hover Simulations II — Coral Spring I

Chaired by: R. NARDUCCI, Boeing Defense, Space & Security and J. ABRAS, HPCMP CREATE

1430 hrs	1500 hrs	1530 hrs	1600 hrs			
Oral Presentation **NASA/Army Benchmark Hover Test: Status and Plans** T. Norman, NASA Ames Research Center, Moffett Field, CA	AIAA-2020-0771 **Hover Predictions Using a High-Order Discontinuous Galerkin Off-Body Discretization** K. Kara, M. Brazell, A. Kirby, D. Mavriplis, University of Wyoming, Laramie, Laramie, WY; E. Duque, Intelligent Light, Rutherford, NJ	AIAA-2020-0772 **Download and Rotor Installed Performance In Hover and Low Advance Ratio Flight** T. Quackenbush, G. Whitehouse, B. Silbaugh, P. Danilov, Continuum Dynamics, Inc., Ewing, NJ	AIAA-2020-0773 **Effects of Crossflow Transition on the S-76 and PSP Rotors in Hover** J. Carnes, J. Coder, University of Tennessee, Knoxville, Knoxville, TN			

Tuesday, 7 January 2020

207-APA-16 — Special Sessions in Honor of Antony Jameson's 85th Birthday II — Barrel Spring II

Chaired by: C. KIM, Seoul National University and Z. WANG, University of Kansas

1430 hrs	1500 hrs	1530 hrs	1600 hrs	1630 hrs	1700 hrs	
AIAA-2020-0774 **Implicit Time Integration of Discontinuous Galerkin Approximations to the Navier-Stokes Equations (Invited)** L. Martinelli, M. Lohry, Princeton University, Princeton, NJ	Oral Presentation **Time-marching: semi-discrete, fully discrete and Fully Discreet (Invited)** P. Roe, University of Michigan, Ann Arbor, Ann Arbor, MI	AIAA-2020-0775 **Towards Wall-Resolved Large Eddy Simulation of CRM and JSM High-Lift Configurations (Invited)** Z. Wang, S. Rahmani, University of Kansas, Lawrence, Lawrence, KS	AIAA-2020-0776 **Direct Reconstruction Method for Physical Domain-based Discontinuous Galerkin Formulation (Invited)** C. Kim, Seoul National University, Seoul, South Korea	Oral Presentation **On High-Order Space-Time Methods for Conservation Laws (Invited)** H. Huynh, NASA Glenn Research Center, Cleveland, OH	Oral Presentation **The anatomy of a high-performance high-order CFD code (Invited)** F. Witherden, Texas A&M University, College Station, TX	

Tuesday, 7 January 2020

208-APA-17 — Aerodynamic Results from Ground/Flight Tests — Florida Ballroom B

Chaired by: L. ZIENTARSKI, AFRL/RQVC and S. VIKEN, NASA Langley Research Center

1430 hrs	1500 hrs	1530 hrs	1600 hrs	1630 hrs	1700 hrs	
AIAA-2020-0777 **Supersonic Traveling Crossflow Wave Characteristics in Ground and Flight Tests** L. Owens, NASA Langley Research Center, Hampton, VA; G. Beeler, Self, Hampton, VA; R. King, A. Chou, P. Balakumar, NASA Langley Research Center, Hampton, VA; D. Banks, NASA Armstrong Flight Research Center, Edwards, CA	AIAA-2020-0778 **In-Situ Measurements of Turbulent Velocity, Temperature, and Acoustic Fluctuations in the Stratosphere** S. Skinner, C. Butler, S. Laurence, University of Maryland, College Park, College Park, MD; A. Mangalam, Tao Systems, Inc., Hampton, VA	AIAA-2020-0779 **Experimental investigations on the Common Research Model at ONERA-S2MA** A. Cartieri, ONERA, Meudon, France	AIAA-2020-0780 **Flight & Ground Testing Data Set for an Unmanned Aircraft: Great Planes Avistar Elite** O. Dantsker, M. Caccamo, Technical University of Munich, Garching, Germany; M. Vahora, University of Illinois, Urbana-Champaign, Urbana, IL; R. Mancuso, Boston University, Boston, MA	AIAA-2020-0781 **Continued Development and Flight Testing of a Long-Endurance Solar-Powered Unmanned Aircraft: UIUC-TUM Solar Flyer** O. Dantsker, M. Theile, M. Caccamo, Technical University of Munich, Garching, Germany; S. Yu, M. Vahora, University of Illinois, Urbana-Champaign, Urbana, IL; R. Mancuso, Boston University, Boston, MA	AIAA-2020-0782 **An Experimental-Computational Investigation of the Aerodynamics of Damaged UAV Wings** R. LeBeau, S. Gururajan, T. Lensing, H. Park, Saint Louis University, St. Louis, MO	

Tuesday, 7 January 2020

209-APA-18 — **Flow Control Demonstrations and Applications II** — **Florida Ballroom C**

Chaired by: E. BLOSCH, Lockheed Martin Corporation and N. HALL, Lockheed Martin Corporation

1430 hrs	1500 hrs	1530 hrs	1600 hrs	1630 hrs	1700 hrs
AIAA-2020-0783	AIAA-2020-0784	AIAA-2020-0785	AIAA-2020-0786	AIAA-2020-0787	AIAA-2020-0788
Wind Tunnel Testing of High Efficiency Low Power (HELP) Actuation for Active Flow Control J. Lin, L. Pack Melton, J. Hannon, M. Andino, M. Koklu, K. Paschal, NASA Langley Research Center, Hampton, VA; et al.	**Flow Control for Enhanced Airplane Takeoff Performance** A. Shmilovich, Y. Yadlin, The Boeing Company, Huntington Beach, CA	**The Effect of Passive Boundary-Layer Fences on Delta Wing Performance at Low Reynolds Number** A. Demoret, M. Walker, M. Reeder, Air Force Institute of Technology, Wright-Patterson AFB, OH	**Mitigation of Nacelle/Pylon Wake on the High-Lift Common Research Model Using a Nacelle Chine** M. Koklu, J. Lin, J. Hannon, L. Pack Melton, M. Andino, K. Paschal, NASA Langley Research Center, Hampton, VA; et al.	**High Efficiency Integrated Propeller-CoFlow Jet Airfoil in Cruise** Y. Ren, G. Zha, University of Miami, Coral Gables, FL	**Detection of Boundary Layer Separation and Implementation of Autonomous Vortex Generators** S. Morice, K. Ginnell, S. Geary, J. Baughn, S. Robinson, University of California, Davis, Davis, CA

Tuesday, 7 January 2020

210-AS-2/APA-19 — **Adaptive Aircraft Surfaces and Structures for Sonic Boom Mitigation** — **Celebration 4**

Chaired by: D. HARTL, Texas A&M University and N. TICHENOR, Texas A&M University

1430 hrs	1500 hrs	1530 hrs	1600 hrs
AIAA-2020-0789	AIAA-2020-0790	AIAA-2020-0791	AIAA-2020-0792
Near-field Pressure Signature Splicing for Low-Fidelity Design Space Exploration of Supersonic Aircraft C. Bolander, D. Hunsaker, Utah State University, Logan, UT	**Identifying Optimal Equivalent Area Changes to Reduce Sonic Boom Loudness** T. Abraham, D. Hunsaker, Utah State University, Logan, UT; J. Weaver-Rosen, R. Malak, Texas A&M University, College Station, TX	**Structurally Feasible Morphing of a Low-Boom Supersonic Transport** J. Schrass, P. Leal, D. Hartl, Texas A&M University, College Station, TX	**Sonic Boom Performance of Low-Boom Aircraft in Non-Standard Atmospheres** D. Lazzara, T. Magee, The Boeing Company, Huntington Beach, CA; H. Shen, J. Mabe, The Boeing Company, Hazelwood, MO

Tuesday, 7 January 2020

211-DGE-2 — **Digital Twin - Definition Harmonization** — **Celebration 11**

1430 - 1630 hrs

This panel will explore varying definitions of the Digital Twin held across the Industry, present the results of the DECI Digital Twin subcommittee's efforts to harmonize a 'baseline' definition and graphic, and debate associated definition attributes to determine if a single harmonized definition of the Digital Twin is possible or appropriate to enable the Aerospace Industry to move forward. . . together.

Moderator: John Matlik, Rolls-Royce Corporation

Panelists:

OEM Perspective	DoD Perspective	Government Perspective	Academic Perspective
Dan Seal The Boeing Company **Don Kinard** Lockheed Martin Corporation	**Ed Kraft** University of Tennessee Space Institute (UTSI)	**John Vickers** NASA	**Mike Grieves** Florida Institute of Technology

Tuesday, 7 January 2020

212-EDU-3 — **ABET and Accreditation in Aerospace Engineering** — **Plaza Ballroom F**

1430 - 1630 hrs

Panelists:

Dave Darmofal Massachusetts Institute of Technology	**Eric Feron** Georgia Institute of Technology	**William Garrard** University of Minnesota	**Krishnaswamy Ravindra** Saint Louis University	**Valana Wells** Arizona State University

Tuesday, 7 January 2020

213-EXPL-3 — **In-Space Infrastructure** — **Bayhill 30**

Chaired by: S. SHARMA, NASA Ames Research Center and C. MOORE, NASA HQ

1430 hrs
AIAA-2020-0793
Orb2: Spherical Space Station Designed for Single Launch and On-Orbit Assembly
V. Holub, Self, Beaverton, OR

1500 hrs
AIAA-2020-0794
Study on the Low-Energy Ballistic Lunar Transfer Orbit for Future Cargo Mission to Gateway
T. Ikenaga, K. Yamanaka, S. Ueda, N. Ishii, Japan Aerospace Exploration Agency (JAXA), Sagamihara, Japan

1530 hrs
AIAA-2020-0795
Autonomous Robot Swarms for Off-World Construction and Resource Mining
J. Thangavelautham, University of Arizona, Tucson, Tucson, AZ

1600 hrs
AIAA-2020-0796
A Comprehensive Risk Assessment Study of the Proposed NASA Lunar Orbital Platform "Gateway" Using the International Space Station as a Benchmark for a Design Driven by Safety
M. Alves-Lacerda, D. Park, Georgia Institute of Technology, Atlanta, GA

1630 hrs
AIAA-2020-0797
Realistic Regolith Models for Plume-Surface Interaction in Spacecraft Propulsive Landings
M. Gale, R. Mehta, P. Liever, CFD Research Corporation (CFDRC), Huntsville, AL; J. Curtis, J. Yang, University of California, Davis, Davis, CA

1700 hrs
AIAA-2020-0798
Magnetic Shielding for a Mars Habitat
L. Sargent, V. Coverstone, University of Miami, Coral Gables, FL

Tuesday, 7 January 2020

214-F360-4 — **Forum 360: Is Hypersonic Flight the Next Big Thing?** — **Regency Ballroom Q**

1430 - 1630 hrs

Moderator: Martiqua Post, Professor of Aeronautics, U.S. Air Force Academy

Panelists:

Frank D. Boensch
X-30 (NASP) Joint Program Office: Deputy Director, Airframe and
Director of Consortia and Technology
Air Force Flight Dynamics Laboratory (ret.)

Mark Lewis
Director, Defense Research and Engineering for Modernization
Office of the Secretary of Defense

Charles McClinton
Hypersonic Technology Manager
NASA (ret.)

Richard Mutzman
Chief Engineer, Aerospace Systems Directorate
Air Force Research Laboratory (ret.)

David Van Wie
Head, Air and Missile Defense Sector
Johns Hopkins University Applied Physics Laboratory

Tuesday, 7 January 2020

215-FD-29/TP-4 — **Perspectives of Hypersonic Boundary Layer Transition: Past, Present and Future (In Honor of the 60th Birthday of Steve Schneider)** — **Plaza Ballroom H**

Chaired by: K. CASPER, Sandia National Laboratories and K. STEPHANI, University of Illinois at Urbana-Champaign

1430 hrs
Oral Presentation
Past, Present, and Future of Quiet Ludwieg Tubes (Invited)
T. Juliano, University of Notre Dame, Notre Dame, IN

1500 hrs
Oral Presentation
Some Observations on Hypersonic Boundary Layer Transition Technology from 1990 to 2020 (Invited)
R. Kimmel, Air Force Research Laboratory, Wright-Patterson AFB, OH

1530 hrs
Oral Presentation
Hypersonic Boundary-Layer Transition Fundamental Research: Recent Achievements and Current Needs (Invited)
E. Marineau, Office of Naval Research, Arlington, VA

1600 hrs
Oral Presentation
Enabling Technologies and Experiments for Hypersonic Boundary-Layer Transition (Invited)
M. Borg, Air Force Research Laboratory, Wright-Patterson AFB, OH

1630 hrs
Oral Presentation
Perspectives on Hypersonic Boundary Layer Transition: From Correlations to Mechanisms (Invited)
G. Candler, University of Minnesota, Twin Cities, Minneapolis, MN

1700 hrs
Oral Presentation
Hypersonic Boundary-Layer Transition: Government/Academic Collaborations as a Means to Accelerate Research and Development (Invited)
K. Casper, Sandia National Laboratories, Albuquerque, NM

Tuesday, 7 January 2020

216-FD-30 — **Unsteady Aerodynamic and Turbulent Flow Challenges for AFRL** — **Orlando Ballroom M**

1430 - 1730 hrs

Tuesday, 7 January 2020

217-FD-31 — **Bio-Inspired and Low-Reynolds Number Flows II** — **Blue Spring I**

Chaired by: C. KANG, University of Alabama in Huntsville and M. WEI, Kansas State University

1430 hrs
AIAA-2020-0799
Deep learning and data assimilation approaches to sensor reduction in estimation of disturbed separated flows
M. Le Provost, University of California, Los Angeles, Los Angeles, CA; W. Hou, California Institute of Technology, Pasadena, CA; J. Eldredge, University of California, Los Angeles, Los Angeles, CA

1500 hrs
AIAA-2020-0800
The initial growth of normalized circulation of the leading-edge vortex on surging and rotating wings
N. Shumway, U.S. Air Force Academy, Colorado Springs, CO; A. Jones, University of Maryland, College Park, College Park, MD

1530 hrs
AIAA-2020-0801
Experimental Investigation into the Streamwise Circulation Generated by Bio-Inspired Pitching Panels
J. King, M. Green, Syracuse University, Syracuse, NY

1600 hrs
AIAA-2020-0802
Unsteady Vorticity Shedding from a Circular Cylinder: Surging, Spinning and Gust Encounters
P. Gehlert, H. Babinsky, University of Cambridge, Cambridge, United Kingdom

1630 hrs
AIAA-2020-0803
Stepped Wings at Moderate Re with Implications on Multipoint Wing Design
Y. Hanna, University of Southern California, Los Angeles, CA; M. West, Concepts-to-Systems, Inc., Danville, VA; J. Kudva, NextGen Aeronautics, Inc., Torrance, CA; G. Spedding, University of Southern California, Los Angeles, CA

1700 hrs
AIAA-2020-0804
Effects of Chordwise Non-uniform Stiffness on Propulsive Performance of Passively-flexing Square Foil
R. Zhu, J. Wang, H. Dong, H. Bart-Smith, University of Virginia, Charlottesville, Charlottesville, VA

Tuesday, 7 January 2020

218-FD-32	CFD Methods IV					Rainbow Spring II
Chaired by: H. LUO, North Carolina State University and D. SANJAYA, University of Tennessee, Knoxville						
1430 hrs AIAA-2020-0805 **A New Fourth-Order Sharp Immersed Interface Method for Solving 3D Poisson Equation with Arbitrary Boundaries** S. Hosseinverdi, University of Arizona, Tucson, Tucson, AZ	1500 hrs AIAA-2020-0806 **Fine-grain Parallel Smoothing by Asynchronous Iterations and Incomplete Sparse Approximate Inverses for Computational Fluid Dynamics** A. Kashi, S. Nadarajah, McGill University, Montréal, Canada	1530 hrs AIAA-2020-0807 **Stable and conservative boundary treatment for difference methods, with application to cut-cell discretizations** N. Sharan, P. Brady, D. Livescu, Los Alamos National Laboratory, Los Alamos, NM	1600 hrs AIAA-2020-0808 **A Staggered Update Procedure (SUP) for Higher Order Cell-centre Finite Volume Method** S. Subudhi, B. Narayanarao, Indian Institute of Science, Bengaluru, India	1630 hrs AIAA-2020-0809 **Complete-search Tensor Contractions for Optimizing High-order Methods** H. You, C. Kim, Seoul National University, Seoul, South Korea		

Tuesday, 7 January 2020

219-FD-33	Vortex Dynamics II					Plaza Ballroom E
Chaired by: C. SCALO and X. AN, Princeton University						
1430 hrs AIAA-2020-0810 **A Compact-Finite-Difference-Based Numerical Framework for Adaptive-Grid-Refinement Simulations of Vortex-Dominated Flows** X. Zhao, C. Scalo, Purdue University, West Lafayette, IN	1500 hrs AIAA-2020-0811 **A Computational Investigation of Vortex Flows Across Shockwaves** F. Ferguson, D. Feng, Y. Gao, North Carolina A&T State University, Greensboro, NC	1530 hrs AIAA-2020-0812 **Experiment Design to Capture the Undisturbed Merging of Streamwise Vortices in Supersonic Flow** I. Quintero, F. Vergine, San Jose State University, San Jose, CA	1600 hrs AIAA-2020-0813 **Modification of Jet Exiting a Cyclone Chamber** O. Khan, A. Ahmed, Auburn University, Auburn, AL	1630 hrs AIAA-2020-0814 **Efficient vortex ring generation with non-parallel planar starting jets in crossflow** B. Steinfurth, J. Weiss, Technical University of Berlin, Berlin, Germany		

Tuesday, 7 January 2020

220-FD-34	Experimental-Computational High-Speed FSI II					Blue Spring II
Chaired by: D. BODONY, University of Illinois at Urbana-Champaign and K. GRANLUND, North Carolina State University						
1430 hrs AIAA-2020-0815 **Hypersonic Shock Wave-Boundary-Layer Interaction on the Control Surface of a Slender Cone** A. Pandey, K. Casper, R. Spillers, M. Soehnel, S. Spitzer, Sandia National Laboratories, Albuquerque, NM	1500 hrs AIAA-2020-0816 **Effects of Surface Compliance on Shock Boundary Layer Interaction in the Caltech Mach 4 Ludwieg Tube** M. Neet, J. Austin, California Institute of Technology, Pasadena, CA	1530 hrs AIAA-2020-0817 **Computation of Backwards-Facing Step-Ramp Induced Shock-Wave Boundary-Layer Interaction** R. Alviani, J. Poggie, G. Blaisdell, Purdue University, West Lafayette, IN				

Tuesday, 7 January 2020

221-FD-35	Turbulent Flows IV					Rainbow Spring I
Chaired by: M. ADLER, Ohio State University and N. AHMAD, NASA Langley Research Center						
1430 hrs AIAA-2020-0818 **Computational Investigation of Dual Impinging Jet Dynamics at Mixed Operating Conditions** S. Stahl, D. Gaitonde, Ohio State University, Columbus, OH	1500 hrs AIAA-2020-0819 **On the Turbulence Statistics of a Hot, Overexpanded Rectangular Jet** S. Chakrabarti, C. Stack, S. Unnikrishnan, D. Gaitonde, Ohio State University, Columbus, OH; F. Baier, A. Karnam, University of Cincinnati, Cincinnati, OH; et al.	1530 hrs AIAA-2020-0820 **A multiscale subgrid decomposition** S. Gs, Los Alamos National Laboratory, Los Alamos, NM	1600 hrs AIAA-2020-0821 **Prediction of Turbulent Non-premixed Combustion by Approximate Inertial Manifolds** M. Akram, V. Raman, University of Michigan, Ann Arbor, Ann Arbor, MI			

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222-FD-36	**Flow Control III**					**Plaza Ballroom K**
Chaired by: D. WILLIAMS, Illinois Institute of Technology and M. JENTZSCH						
1430 hrs AIAA-2020-0822 **Unsteady Aerodynamic Loads on a UAS Model during a Pitch Maneuver with Roll** X. He, D. Williams, Illinois Institute of Technology, Chicago, IL	1500 hrs AIAA-2020-0823 **Transitory, Bi-Directional Control of the Aerodynamic Loads on an Airfoil** Y. Tan, A. Glezer, Georgia Institute of Technology, Atlanta, GA	1530 hrs AIAA-2020-0824 **Geometric Nonlinear Control of the Lift Dynamics of a Pitching-Plunging Wing** H. Taha, University of California, Irvine, Irvine, CA	1600 hrs AIAA-2020-0825 **Flow Control on an Unmanned Aerial Vehicle Using a Plasma Actuator Driven By a Substrate-Size Power Supply** S. Sekimoto, K. Fujii, Tokyo University of Science, Katsushika, Japan; H. Yoneda, Teikyo University, Utsunomiya, Japan	1630 hrs AIAA-2020-0826 **Transition Control for a Swept Wing by Crossflow Stabilization Using Plasma Actuators** T. Matsuno, H. Esaki, K. Tanaka, Tottori University, Tottori, Japan; H. Aono, Tokyo University of Science, Tokyo, Japan; D. Kwak, Japan Aerospace Exploration Agency (JAXA), Mitaka, Japan	1700 hrs AIAA-2020-0827 **Separation Control in 2-D Closed Channel Bend** T. Samper, T. Corke, University of Notre Dame, Notre Dame, IN	

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223-FD-37	**Instability and Transition IV**					**Plaza Ballroom J**
Chaired by: M. CHOUDHARI, NASA-Langley Research Center and J. EKATERINARIS, Embry-Riddle Aeronautical University						
1430 hrs AIAA-2020-0828 **Streak Instabilities on HIFiRE-5 Elliptic Cone** M. Choudhari, F. Li, NASA Langley Research Center, Hampton, VA; P. Paredes, National Institute of Aerospace, Hampton, VA	1500 hrs AIAA-2020-0829 **Well-posed spatial marching of high-amplitude perturbations in viscous shear flows** S. Harris, P. Hack, Stanford University, Stanford, CA	1530 hrs AIAA-2020-0830 **Streaks in high-speed boundary layers: a view through the full nonlinear boundary-region equations** A. Sescu, Mississippi State University, Starkville, MS; M. Afsar, University of Strathclyde, Glasgow, United Kingdom; Y. Hattori, Tohoku University, Sendai, Japan	1600 hrs AIAA-2020-0831 **Direct numerical simulations of instability wave-streak interactions in forced laminar separation bubbles** S. Hosseinverdi, University of Arizona, Tucson, Tucson, AZ	1630 hrs AIAA-2020-0832 **Experimental Study of the Role of High- and Low-speed Streaks in Turbulent Wedge Spreading** A. Berger, E. White, Texas A&M University, College Station, TX	1700 hrs AIAA-2020-0833 **Stability and Performance Analysis of Nonlinear and Non-Normal Systems using Quadratic Constraints** A. Kalur, P. Seiler, M. Hemati, University of Minnesota, Twin Cities, Minneapolis, MN	

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224-FD-38	**Wall-Bounded Flows**					**Rock Spring I & II**
Chaired by: C. MARKS, AFRL/RQT and A. AHMED						
1430 hrs AIAA-2020-0834 **Turbine Secondary Flow Response to Upstream Periodic Unsteadiness** N. Fletcher, Innovative Scientific Solutions, Inc., Dayton, OH; M. Wolff, Wright State University, Dayton, OH; C. Marks, Air Force Research Laboratory, Wright-Patterson AFB, OH	1500 hrs AIAA-2020-0835 **Mach Number Effects on Secondary Motion in Corner Flow Boundary Layers** C. McKenna, University of Tennessee, Tullahoma, Tullahoma, TN; B. Rice, Air Force Research Laboratory, Arnold AFB, TN; N. Bisek, Air Force Research Laboratory, Wright-Patterson AFB, OH; S. Peltier, J. Hofferth, Air Force Research Laboratory, Arnold AFB, TN	1530 hrs AIAA-2020-0836 **Numerical Investigation of Low-Pressure Turbine Stage with Unsteady Wakes** S. Romero Martinez, A. Gross, New Mexico State University, Las Cruces, NM	1600 hrs AIAA-2020-0837 **The Effect of the Corner Boundary Layer on Shock-induced Separation in a Rectangular Channel** K. Sabnis, University of Cambridge, Cambridge, United Kingdom; D. Galbraith, Air Force Research Laboratory, Wright-Patterson AFB, OH; H. Babinsky, University of Cambridge, Cambridge, United Kingdom; J. Benek, Air Force Research Laboratory, Wright-Patterson AFB, OH	1630 hrs AIAA-2020-0838 **Experimental and Numerical Investigation of a Roof-Scale Solar Chimney** L. Bahrainirad, University of Arizona, Tucson, Tucson, AZ; M. Hasan, New Mexico State University, Las Cruces, NM; H. Fasel, University of Arizona, Tucson, Tucson, AZ; A. Gross, New Mexico State University, Las Cruces, NM		

Tuesday, 7 January 2020						
225-GNC-11/IS-6	**Advances in Adaptive Control for Aerospace Systems II (Invited)**					**Celebration 9**
Chaired by: J. MUSE, AFRL/RQQA and B. GRUENWALD, U. S. Army Research Laboratory (APG)						
1430 hrs AIAA-2020-0839 **Adaptive Flight Control with Unknown Time-Varying Unstable Zero Dynamics (Invited)** S. Islam, A. Bruce, T. Nguyen, I. Kolmanovsky, D. Bernstein, University of Michigan, Ann Arbor, Ann Arbor, MI	1500 hrs AIAA-2020-0840 **Model-Reference Adaptive Control of Distributed Lagrangian Infinite-Dimensional Systems Using Hamilton's Principle (Invited)** N. Nguyen, K. Hashemi, NASA Ames Research Center, Moffett Field, CA; E. Arabi, University of Michigan, Ann Arbor, Ann Arbor, MI; T. Yucelen, University of South Florida, Tampa, FL	1530 hrs AIAA-2020-0841 **Dynamic Control Allocation for a Class of Over-actuated Aircraft (Invited)** R. Baggi, University of California, Riverside, Riverside, CA; E. Franco, University of California, Los Angeles, Los Angeles, CA; A. Serrani, Ohio State University, Columbus, OH	1600 hrs AIAA-2020-0842 **On Suppressing the Effect of Measurement Noise in Model Reference Adaptive Control (Invited)** K. Dogan, S. Ristevski, T. Yucelen, University of South Florida, Tampa, FL; J. Muse, Air Force Research Laboratory, Wright-Patterson AFB, OH	1630 hrs AIAA-2020-0843 **Adaptive Control Design Using the Udwadia-Kalaba Formulation for Hovering Over an Asteroid with Unknown Gravitational Parameters (Invited)** W. Stackhouse, M. Nazari, T. Henderson, R. Prazenica, Embry-Riddle Aeronautical University, Daytona Beach, FL		

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226-GNC-12	Entry, Descent and Landing GN&C Technology III (Invited)					Bayhill 31
Chaired by: J. CARSON, NASA and K. DEMARS, Texas A&M University						
1430 hrs AIAA-2020-0844 **A Real-Time Algorithm for Non-Convex Powered Descent Guidance** T. Reynolds, D. Malyuta, M. Mesbahi, B. Acikmese, University of Washington, Seattle, Seattle, WA; J. Carson, NASA Johnson Space Center, Houston, TX	1500 hrs AIAA-2020-0845 **The Theory of Fractional-Polynomial Powered Descent Guidance** P. Lu, San Diego State University, San Diego, CA	1530 hrs AIAA-2020-0846 **Overview of a Generalized Numerical Predictor-Corrector Targeting Guidance with Application to Human-Scale Mars Entry, Descent, and Landing** R. Lugo, NASA Langley Research Center, Hampton, VA; R. Powell, Analytical Mechanics Associates, Inc., Hampton, VA; A. Dwyer-Cianciolo, NASA Langley Research Center, Hampton, VA	1600 hrs AIAA-2020-0847 **Development of a Numeric Predictor-Corrector Aerocapture Guidance for Direct Force Control** D. Matz, C. Cerimele, NASA Johnson Space Center, Houston, TX	1630 hrs AIAA-2020-0848 **Comparison of Real-time Guidance Options for Drag-Modulation Entry at Mars** D. Fawley, Z. Putnam, University of Illinois, Urbana-Champaign, Urbana, IL	1700 hrs AIAA-2020-0849 **Learning-based Optimal Control for Planetary Entry, Powered Descent and Landing Guidance** S. You, C. Wan, R. Dai, Ohio State University, Columbus, OH; P. Lu, San Diego State University, San Diego, CA; J. Rea, NASA Johnson Space Center, Houston, TX	

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227-GNC-13	Aircraft Control II					Bayhill 32
Chaired by: G. TALLANT, Lockheed Martin Aeronautics and J. STECK, Wichita State University						
1430 hrs AIAA-2020-0850 **Adaptive Prediction of Aircraft Loss-of-Control Margins and Safe Control Envelopes with Longitudinally and Laterally Coupled Higher-Order Dynamics** M. Rafi, J. Steck, Wichita State University, Wichita, KS; A. Chakravarthy, University of Texas, Arlington, Arlington, TX	1500 hrs AIAA-2020-0851 **A Computationally Efficient Approach for Stochastic Reachability Set Analysis** A. Jain, D. Gueho, P. Singla, Pennsylvania State University, University Park, PA	1530 hrs AIAA-2020-0852 **A Variable Stability In-Flight Simulation System using Incremental Non-Linear Dynamic Inversion** P. Scholten, M. van Paassen, M. Mulder, Delft University of Technology, Delft, The Netherlands	1600 hrs AIAA-2020-0853 **Control Effector Unsaturation Modification to the Cascading Generalized Inverse Control Allocation Algorithm** M. Acheson, I. Gregory, NASA Langley Research Center, Hampton, VA; J. Prasad, Georgia Institute of Technology, Atlanta, GA	1630 hrs AIAA-2020-0854 **Robust Nonlinear Flight Controller For Small Unmanned Aircraft Vehicle based on Incremental BackStepping** E. Safwat, Z. Weiguo, Northwestern Polytechnical University, Xi'an, China; M. Kassem, A. Mohsen, Military Technical College, Cairo, Egypt	1700 hrs AIAA-2020-0855 **Parameter Adaptive Terminal Sliding Mode Control of Flexible Coupling Air-Breathing Hypersonic Vehicle** H. Jin, H. Chen, W. Lin, Beihang University, Beijing, China; C. Xu, China Aerospace Science and Industry Corporation (CASIC), Beijing, China	

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228-GNC-14	Intelligent/Autonomous Aerial Systems I					Bayhill 17
Chaired by: A. LAMPTON, Systems Technology, Inc.						
1430 hrs AIAA-2020-0856 **Parameterized Trajectory Planning for Dynamic Soaring** Z. Li, J. Langelaan, Pennsylvania State University, University Park, PA	1500 hrs AIAA-2020-0857 **Chance-Constrained Approach to Optimal Path Planning for Urban UAS** R. Aggarwal, M. Kumar, Ohio State University, Columbus, OH	1530 hrs AIAA-2020-0858 **A CAM/AM-based Trajectory Generation Method for Aerial Power Plant Inspection in GPS-denied Environments** M. Rizia, A. Ortega, J. Reyes Muñoz, M. McGee, A. Choudhuri, A. Flores-Abad, University of Texas, El Paso, El Paso, TX	1600 hrs AIAA-2020-0859 **Optimal Control Approach to Terrain Following Trajectory Generation** S. Stephens, J. Hess, D. Kunz, Air Force Institute of Technology, Wright-Patterson AFB, OH	1630 hrs AIAA-2020-0860 **Generalized Shape Expansion-Based Motion Planning for UAVs in Three Dimensional Obstacle-cluttered Environment** V. Zinage, S. Ghosh, Indian Institute of Technology Madras, Chennai, India	1700 hrs AIAA-2020-0861 **Comparison of A* and RRT in real–time 3D path planning of UAVs** C. Zammit, E. Van Kampen, Delft University of Technology, Delft, The Netherlands	

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229-GNC-15	Missile Guidance and Control II					Bayhill 33
Chaired by: B. BISWELL, Raytheon Missile Systems and M. MAJJI, Texas A&M University						
1430 hrs AIAA-2020-0862 **Command Shaping for a Torque, Jerk, and Acceleration Limited System** P. Olejnik, D. Ridgely, Raytheon Company, Tucson, AZ	1500 hrs AIAA-2020-0863 **Optimal Position and Heading Control of Aerospace Vehicles** R. Morgan, Raytheon Company, Tucson, AZ	1530 hrs AIAA-2020-0864 **Costate Initialization from Rough Trajectory Estimates** E. Skamangas, J. Lawton, Naval Surface Warfare Center, Dahlgren, VA; J. Black, Virginia Polytechnic Institute and State University, Blacksburg, VA	1600 hrs AIAA-2020-0865 **Nonlinear Model Predictive Control based Missile Guidance for Target Interception** D. Bhattacharjee, A. Chakravarthy, K. Subbarao, University of Texas, Arlington, Arlington, TX			

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230-GTE-8	Turbines II					Manatee Spring II
Chaired by: R. KANCHERLA, University of Central Florida and M. BELMOUSS						
1430 hrs AIAA-2020-0866 **Experimental Test Rig for 3D Printed, Axial Compressor Utilizing a COTS Turbocharger** G. Walker, M. Turner, University of Cincinnati, Cincinnati, OH; J. Hoke, Innovative Scientific Solutions, Inc., Dayton, OH; A. Holley, Air Force Research Laboratory, Wright-Patterson AFB, OH	1500 hrs AIAA-2020-0867 **Collaborative Aircraft Engine Preliminary Design using a Virtual Engine Platform, Part A: Architecture and Methodology** S. Reitenbach, M. Vieweg, R. Becker, C. Hollmann, F. Wolters, J. Schmeink, German Aerospace Center (DLR), Cologne, Germany; et al.	1530 hrs AIAA-2020-0868 **Small Turbojet Altitude Test Facility** N. Grannan, A. Knisely, K. Cho, J. Hoke, Innovative Scientific Solutions, Inc., Dayton, OH; R. Huff, A. Holley, Air Force Research Laboratory, Wright-Patterson AFB, OH	1600 hrs AIAA-2020-0869 **Micro-Turbine Performance Study** R. DePaola, F. Schauer, M. Polanka, Air Force Institute of Technology, Wright-Patterson AFB, OH; N. Grannan, Innovative Scientific Solutions, Inc., Dayton, OH	1630 hrs AIAA-2020-0870 **Improving Turbofan Transient Characteristics with Multivariable Control** S. Khalid, Perspecta, Inc., Shantilli, VA; J. Diegelman, a.i. solutions, Inc., Lanham, MD	1700 hrs AIAA-2020-0871 **Automated Turbomachinery Hot-to-Cold Transformation** J. Holder, M. Turner, University of Cincinnati, Cincinnati, OH; M. Celestina, NASA Glenn Research Center, Cleveland, OH	

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231-HSABP-4/PC-10	High-Speed Combustion I					Florida Ballroom A
Chaired by: T. OMBRELLO, Air Force Research Laboratory and T. ABDEL-SALAM, East Carolina University						
1430 hrs Oral Presentation **Supersonic turbulent combustion physics** C. Fureby, Swedish Defense Research Agency (FOI), Stockholm, Sweden	1500 hrs AIAA-2020-0872 **An OpenFOAM-based fully compressible reacting flow solver with detailed transport and chemistry for high-speed combustion simulations** D. Zhou, S. Zou, S. Yang, University of Minnesota, Minneapolis, Minneapolis, MN	1530 hrs AIAA-2020-0873 **Combustion Modeling using the Moving Discontinuous Galerkin Finite Element Method with Interface Condition Enforcement** R. Johnson, A. Kercher, A. Corrigan, D. Kessler, Naval Research Laboratory, Washington, D.C.	1600 hrs AIAA-2020-0874 **Progress in Supersonic Spray Combustion Modeling** F. Ladeinde, Stony Brook University, Stony Brook, NY	1630 hrs AIAA-2020-0875 **Influence of Periodicity on Simulations of a Round Supersonic Combustor Using Hybrid RANS/LES** D. Peterson, E. Hassan, B. Bornhoft, Air Force Research Laboratory, Wright-Patterson AFB, OH		

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232-ICME-3 1430 - 1530 hrs	ICME Lecture	Orlando Ballroom N
ICME - Success Cases and Lessons Learned John Allison		

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233-IS-7	Autonomy - Multi-Agent Systems					Celebration 10
Chaired by: A. CHAKRABARTY						
1430 hrs AIAA-2020-0876 **CONCORD: A UAV Conflict Resolution System using Correlated Equilibrium based Decision Making** L. Tony, D. Ghose, Indian Institute of Science, Bengaluru, India; A. Chakravarthy, University of Texas, Arlington, Arlington, TX	1500 hrs AIAA-2020-0877 **A Taxonomy for Aerospace Collision Avoidance with Implications for Automation in Space Traffic Management** K. Hobbs, Air Force Research Laboratory, Wright-Patterson AFB, OH; E. Feron, Georgia Institute of Technology, Atlanta, GA	1530 hrs AIAA-2020-0878 **Relative Dynamics Modeling and Three-Dimensional Formation Control for Leader-Follower UAVs in the Presence of Wind** A. Al-Radaideh, R. Selje II, L. Sun, New Mexico State University, Las Cruces, NM	1600 hrs AIAA-2020-0879 **Optimal Multi-Agent Search and Rescue Using Potential Field Theory** J. Cooper, NASA Langley Research Center, Hampton, VA	1630 hrs AIAA-2020-0880 **Collision Avoidance in OpenUxAS** J. English, J. Wilhelm, Ohio University, Athens, OH	1700 hrs AIAA-2020-0881 **Autonomous flight for Multi-copters flying in UTM -TCL4+ sharing common airspace** A. Chakrabarty, Stinger Ghaffarian Technologies, Inc., Moffett Field, CA; C. Ippolito, NASA Ames Research Center, Moffett Field, CA	

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234-MAT-5/STR-7/MDO-6/ NDA-5/SE-4	**ICME: Integrating Composite Manufacturing Modeling with Design**					**Orlando Ballroom N**
Chaired by: J. DUSTIN and A. AVILA, Universidade Federal de Minas Gerais						
1430 hrs **No Presentations**		1530 hrs AIAA-2020-0882 **Multiscale Modeling for Virtual Manufacturing of Thermoset Composites** S. Shah, University of Massachusetts, Lowell, Lowell, MA; S. Patil, P. Deshpande, A. Krieg, K. Kashmari, H. Al Mahmud, Michigan Technological University, Houghton, MI; et al.	1600 hrs AIAA-2020-0883 **Fabrication of the twist morphing wing for the UAV by CFRP with applying the electrodeposition resin molding method** K. Katagiri, S. Yamaguchi, S. Kawakita, Osaka University, Osaka, Japan; S. Honda, K. Sasaki, Hokkaido University, Sapporo, Japan; N. Kogiso, Osaka Prefecture University, Sakai, Japan; et al.	1630 hrs AIAA-2020-0884 **Design Optimization of Metallic Alloy Microstructures under Epistemic Uncertainty** P. Acar, Virginia Polytechnic Institute and State University, Blacksburg, VA		

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235-MDO-7/APA-20	**Aerodynamic Shape Optimization I**					**Celebration 6**
Chaired by: G. KURUVILA, Boeing Research & Technology and S. CHOI, Virginia Tech						
1430 hrs AIAA-2020-0885 **Memory Efficient Adjoint Sensitivity Analysis for Aerodynamic Shape Optimization** R. Djeddi, K. Ekici, University of Tennessee, Knoxville, Knoxville, TN	1500 hrs AIAA-2020-0886 **One Shot Optimization with Generalized Constraints** B. Munguia, J. Alonso, Stanford University, Stanford, CA	1530 hrs AIAA-2020-0887 **On the effect of PDE-based wall distance fields on adjoint sensitivities for turbulent flow** M. Ugolotti, University of Cincinnati, Cincinnati, OH; N. Wukie, Air Force Research Laboratory, Dayton, OH; M. Turner, P. Orkwis, University of Cincinnati, Cincinnati, OH	1600 hrs AIAA-2020-0888 **Shape Sensitivity for High-speed Flows with Shocks** M. Kulkarni, Embry-Riddle Aeronautical University, Daytona Beach, FL	1630 hrs AIAA-2020-0889 **A Framework of gradient-based shape optimization using feature-based CAD parameterization** L. Sun, W. Yao, T. Robinson, Queen's University Belfast, Belfast, United Kingdom; S. Marques, University of Surrey, Guildford, United Kingdom; C. Armstrong, Queen's University Belfast, Belfast, United Kingdom		

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236-MDO-8	**Topology and Shape Optimization I**					**Celebration 2**
Chaired by: H. KIM, University of California, San Diego and G. KENNEDY, Georgia Institute of Technology						
1430 hrs AIAA-2020-0890 **Multiscale Topology Optimization of Thermoelastic Structures Using the Level Set Method** L. Li, H. Kim, University of California, San Diego, La Jolla, CA	1500 hrs AIAA-2020-0891 **Level Set Topology Optimization of Load Carrying Heat Exchangers** S. Kambampati, University of California, San Diego, San Diego, CA; J. Gray, NASA Glenn Research Center, Cleveland, OH; H. Kim, University of California, San Diego, San Diego, CA	1530 hrs AIAA-2020-0892 **Topology optimization with discrete adjoint sensitivity** H. Chung, S. Kambampati, H. Kim, University of California, San Diego, San Diego, CA	1600 hrs AIAA-2020-0893 **Assembly Level Topology Optimization Towards a Part Consolidation Algorithm for Additive Manufacturing** L. Crispo, I. Kim, Queen's University, Kingston, Canada	1630 hrs AIAA-2020-0894 **Aerodynamic Driven Multidisciplinary Topology Optimization of Compliant Airfoils** P. Gomes, R. Palacios, Imperial College London, London, United Kingdom		

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237-MST-6/SOF-4	**Modeling- and Simulation-Based Software Development and Verification II (invited)**					**Coral Spring II**
Chaired by: U. DURAK, DLR-German Aerospace Center and C. TORENS, DLR - German Aerospace Center						
1430 hrs AIAA-2020-0895 **Simulation and Closed-Loop Testing of Camera, Radar, and Lidar Sensors for Highly Automated Verification and Validation of Data Fusion Systems (Invited)** J. Allen, B. Hager, dSPACE, Inc., Wixom, MI	1500 hrs AIAA-2020-0896 **Applying IEEE Recommended Practice for Distributed Simulation Engineering and Execution Process for Modeling and Simulation Based Airborne Systems Engineering (Invited)** U. Durak, German Aerospace Center (DLR), Braunschweig, Germany; A. D'Ambrogio, University of Rome "Tor Vergata", Rome, Italy; T. Gerlach, German Aerospace Center (DLR), Braunschweig, Germany	1530 hrs Oral Presentation **Modelling Approach for Better Comprehensibility of Side Effects During Test Executions in Variable Sized Test Systems (Invited)** A. Himmler, dSPACE GmbH, Paderborn, Germany	1600 hrs AIAA-2020-0897 **Simulation-Based and Formal Verification of Domain-Specific Language Model (Invited)** B. Chhaya, S. Jafer, Embry-Riddle Aeronautical University, Daytona Beach, FL	1630 hrs AIAA-2020-0898 **High Fidelity Progressive Reinforcement Learning for Agile Maneuvering UAVs (Invited)** C. Bekar, B. Yuksek, Istanbul Technical University, Istanbul, Turkey; G. Inalhan, Cranfield University, Cranfield, United Kingdom	1700 hrs **Open Discussion**	

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238-MVCE-3	**Geometry and Mesh Generation**					**Bayhill 20**
Chaired by: W. JONES, NASA-Langley Research Center and G. ARAYA, University of Puerto Rico Mayaguez						
1430 hrs AIAA-2020-0899 **Geometry Repair and Construction using NURBS Refitting in Capstone** W. Szymczak, S. Dey, E. Mestreau, R. Aubry, M. Williamschen, Naval Research Laboratory, Washington, D.C.	1500 hrs AIAA-2020-0900 **Creating & Exploring a Design Space via Digital Geometry** W. Dawes, Cambridge University, Cambridge, United Kingdom	1530 hrs AIAA-2020-0901 **Flexible 3D medial partitioning for CFD and FEA meshing** M. Gammon, J. Bucklow, R. Fairey, S. Seebooa, ITI, Ltd., Cambridge, United Kingdom	1600 hrs AIAA-2020-0902 **Advancing Layer Surface Mesh Generation** J. Singh, C. Ollivier Gooch, University of British Columbia, Vancouver, Canada			

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239-NDA-6/MDO-9	**Design Under Uncertainty I**					**Celebration 3**
Chaired by: H. BAE, Wright State University and G. IACCARINO, Stanford University						
1430 hrs AIAA-2020-0903 **A Delaunay-based method for optimizing infinite time averages of numerical discretizations of ergodic systems** P. Beyhaghi, ASML, San Diego, CA; S. Alimo, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA; M. Zhao, T. Bewley, University of California, San Diego, San Diego, CA	1500 hrs AIAA-2020-0904 **Large-scale multidisciplinary optimization under uncertainty for electric vertical takeoff and landing aircraft** T. Ha, J. Hwang, University of California, San Diego, San Diego, CA	1530 hrs AIAA-2020-0905 **Modeling and Impact of High-pressure Turbine Blade Trailing Edge Film Cooling Hole Variations** J. Kamenik, D. Toal, A. Keane, University of Southampton, Southampton, United Kingdom; L. Högner, Technical University of Dresden, Dresden, Germany; M. Meyer, Rolls-Royce Group plc, Blankenfelde-Mahlow, Germany; S. Shahpar, Rolls-Royce Group plc, Derby, United Kingdom	1600 hrs AIAA-2020-0906 **Towards Design of Airfoil Pressure Tap Locations for Real-Time Predictions Under Uncertainty Using Bayesian Neural Networks** W. Shen, X. Huan, University of Michigan, Ann Arbor, Ann Arbor, MI; B. Zhou, N. Gauger, Technical University of Kaiserslautern, Kaiserslautern, Germany	1630 hrs AIAA-2020-0907 **Multi-model optimization approach of aircraft structures under uncertainty using horsetail matching and RBDO methods** C. Cid Bengoa, A. Baldomir, S. Hernandez, University of A Coruña, A Coruña, Spain; J. Jarrett, University of Cambridge, Cambridge, United Kingdom	1700 hrs AIAA-2020-0908 **Uncertainty Analysis of Trajectory Tracking for Autonomous Dynamic Soaring** K. He, J. Wang, A. Gorodetsky, University of Michigan, Ann Arbor, Ann Arbor, MI	

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240-PC-11	**Spray and Droplet Combustion I**					**Bayhill 25**
Chaired by: R. SANKARAN, Oak Ridge National Laboratory and T. DROZDA, NASA Langley Research Center						
1430 hrs Oral Presentation **Challenges in spray combustion modeling for aerospace applications (Invited)** M. Soteriou, United Technologies Corporation, East Hartford, CT	1500 hrs AIAA-2020-0909 **Optimization and uncertainty quantification of spray break-up submodel with regularized multi-task neural nets** H. Zhang, K. Bavandla, University of Minnesota, Minneapolis, Minneapolis, MN; X. Gao, J. Gao, Microsoft Corporation, Redmond, WA; P. Yi, S. Yang, University of Minnesota, Minneapolis, Minneapolis, MN	1530 hrs AIAA-2020-0910 **Lagrangian simulations of spray interaction with a surface using a stochastic multi-regime impingement model** W. Ge, V. Ramanuj, R. Sankaran, Oak Ridge National Laboratory, Oak Ridge, TN	1600 hrs AIAA-2020-0911 **Sensitivity of Lagrangian Spray Model Prediction to Operating Conditions Evaluated Using High Fidelity Crossflow Atomization Simulations** X. Li, United Technologies Corporation, East Hartford, CT	1630 hrs AIAA-2020-0912 **Geometry and Spray Characterization of Standard Simplex Atomizers** B. Sforzo, Argonne National Laboratory, Lemont, IL; S. Leask, A. Li, University of California, Irvine, Irvine, CA; A. Tekawade, C. Powell, Argonne National Laboratory, Lemont, IL; V. McDonell, University of California, Irvine, Irvine, CA; et al.	1700 hrs AIAA-2020-0913 **Spray and Fuel-Air Characterization of Advanced Biofuels** S. Salauddin, J. Reyes, R. Kumar, K. Ahmed, University of Central Florida, Orlando, FL	

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241-PC-12	**Turbulent Combustion II**					**Bayhill 26**
Chaired by: P. HAMLINGTON, University of Colorado, Boulder and B. RANKIN, Air Force Research Laboratory						
1430 hrs AIAA-2020-0914 **Experimental Measurement of Filtered Kinetic Energy Dynamics in Premixed Swirl Flames** A. Kazbekov, A. Steinberg, Georgia Institute of Technology, Atlanta, GA	1500 hrs AIAA-2020-0915 **The Influence of Vorticity on Turbulent Premixed Flames** C. Rising, A. Morales, J. Reyes, K. Ahmed, University of Central Florida, Orlando, FL	1530 hrs AIAA-2020-0916 **Thermal dissipation rate measurements in turbulent non-premixed jet flames: dissipation length scales, layer structure, and the impact of flow turbulence** T. McManus, J. Sutton, Ohio State University, Columbus, OH	1600 hrs AIAA-2020-0917 **DNS of Lean Hydrogen Turbulent Premixed Flames at High Karlovitz Number Conditions** W. Song, F. Hernandez Perez, King Abdullah University of Science and Technology, Thuwal, Saudi Arabia; A. Tingas, University of the Highlands and Islands, Perth, United Kingdom; H. Im, King Abdullah University of Science and Technology, Thuwal, Saudi Arabia	1630 hrs AIAA-2020-0918 **Effects of Flame Structures on Direct Combustion Noise Produced by Lean-Premixed H_2/Air Low-Swirl Jet Flames** T. Shoji, Japan Aerospace Exploration Agency (JAXA), Chofu, Japan; Y. Iwasaki, Keio University, Yokohama, Japan; K. Kato, S. Yoshida, S. Tachibana, Japan Aerospace Exploration Agency (JAXA), Chofu, Japan; T. Yokomori, Keio University, Yokohama, Japan		

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242-PDL-6	**Plasma Aerodynamics Discussion Group (based on J_Phys_D Special Issue)**					**Bayhill 21**
Chaired by: S. LEONOV, University of Notre Dame						
1430 hrs Oral Presentation **Turbulent Boundary Layer Drag Reduction Using Pulsed-DC Plasma Actuator Arra** F. Thomas, T. Corke, University of Notre Dame, Notre Dame, IN	1500 hrs Oral Presentation **Active Flow Control in High-Speed Flows Using Plasma Actuators: Reinventing the Wheel in Excitation of Flow Instabilities** M. Samimy, Ohio State University, Columbus, OH	1530 hrs **Open Discussion**	1600 hrs Oral Presentation **Fundamental mechanisms in nanosecond discharges** C. Laux, CentraleSupélec, Châtenay-Malabry, France	1630 hrs Oral Presentation **Challenges in Numerical Simulation of Nanosecond-Pulse Discharges** J. Poggie, S. Macheret, T. Piskin, V. Podolsky, Purdue University, West Lafayette, IN	1700 hrs **Open Discussion**	

Tuesday, 7 January 2020						
243-PDL-7/TP-5	**High Enthalpy Facilities**					**Bayhill 22**
Chaired by: A. NAGLE, Ball Aerospace						
1430 hrs AIAA-2020-0919 **Preliminary Measurements of the Motion of Arcjet Current Channel Using Inductive Magnetic Probes** M. Haw, J. Meurisse, Science and Technology Corporation, Moffett Field, CA; S. Visser, S. Izquierdo, University of Illinois, Urbana-Champaign, Urbana, IL; J. Schulz, Analytical Mechanics Associates, Inc., Moffett Field, CA; N. Mansour, NASA Ames Research Center, Moffett Field, CA	1500 hrs AIAA-2020-0920 **Nitric Oxide Laser-Induced Fluorescence Rotational Thermometry in a Hypersonic Non-Equilibrium Flow** C. McDougall, C. Johansen, University of Calgary, Calgary, Canada; R. Herrmann-Stanzel, University of Vermont, Burlington, Burlington, VT; P. Danehy, S. Splinter, J. Gragg, NASA Langley Research Center, Hampton, VA	1530 hrs AIAA-2020-0921 **Inductively Coupled Facility Qualification for Electron Transpiration Cooling Investigations** A. Morin, R. Osborn, J. Schindler, P. Jagun, D. Fletcher, J. Meyers, University of Vermont, Burlington, Burlington, VT				

Tuesday, 7 January 2020						
244-PGC-5	**Pressure Gain Combustion: Concepts and Test Facilities**					**Manatee Spring I**
Chaired by: J. HOKE, Innovative Scientific Solutions Incorporated and J. BURR, University of Maryland at College Park						
1430 hrs AIAA-2020-0922 **Performance of an Actively Valved and Acoustically Resonant Pulse Combustor with Liquid Gasoline Fuel** X. Zhu, J. Lisanti, W. Roberts, King Abdullah University of Science and Technology, Jeddah, Saudi Arabia	1500 hrs AIAA-2020-0923 **Pressure and Visualization Measurements on Pulsed Combustion Thrustor** M. Asahara, J. Kasahara, K. Matsuoka, A. Kawasaki, Nagoya University, Nagoya, Japan; A. Matsuo, Keio University, Yokohama, Japan; I. Funaki, Japan Aerospace Exploration Agency (JAXA), Sagamihara, Japan	1530 hrs AIAA-2020-0924 **Shock-Induced High-Speed Reactions in High Enthalpy Hypersonic Flow** J. Sosa, D. Rosato, K. Ahmed, University of Central Florida, Orlando, FL	1600 hrs AIAA-2020-0925 **Redistribution of Transient Shock Waves Using Shock Dividers** B. Thethy, Monash University, Clayton, Australia; M. Rezay Haghdoost, C. Paschereit, Technical University of Berlin, Berlin, Germany; D. Honnery, D. Edgington-Mitchell, Monash University, Clayton, Australia; K. Oberleithner, Technical University of Berlin, Berlin, Germany	1630 hrs AIAA-2020-0926 **Evaluation of Shock Dividers using Numerical and Experimental Methods** M. Rezay Haghdoost, Technical University of Berlin, Berlin, Germany; B. Thethy, Monash University, Clayton, Australia; M. Nadolski, R. Klein, Free University of Berlin, Berlin, Germany; D. Honnery, D. Edgington-Mitchell, Monash University, Clayton, Australia; et al.	1700 hrs AIAA-2020-0927 **Quantification of the Loss Mechanisms of a Ram Rotating Detonation Engine** T. Kaemming, M. Fotia, J. Hoke, Innovative Scientific Solutions, Inc., Dayton, OH; S. Schumaker, Air Force Research Laboratory, Wright-Patterson AFB, OH; F. Schauer, Air Force Institute of Technology, Wright-Patterson AFB, OH	

Tuesday, 7 January 2020		
245-RLA-2 **1430 - 1600 hrs**	**Speed Mentoring**	**Regency Ballroom O&P**
Leaders in the aerospace industry will take time to meet with the Rising Leaders participants and share their experiences. This event is a great way to get insight and make new contacts.		

Tuesday, 7 January 2020						
246-SATS-1	**Small Satellites Engineering**					**Plaza Ballroom G**
Chaired by: J. STRAUB, North Dakota State University						
1430 hrs AIAA-2020-0928 **Failure Investigation and Improvement of MEMS Microthruster for SmallSat Attitude Control** S. Pugia, D. Mayper, A. Cofer, A. Alexeenko, Purdue University, West Lafayette, IN	1500 hrs AIAA-2020-0929 **Accelerated Testing of Ultraviolet and Atomic Oxygen Effects on 3-D Printed Polyetherimide Plastic** W. Gallagher, T. Shelton, R. Kemnitz, C. Hartsfield, Air Force Institute of Technology, Wright-Patterson AFB, OH	1530 hrs AIAA-2020-0930 **Laboratory-scale Test Platforms for Femto-satellite Attitude Control Systems** L. Stamat, Z. Hu, M. McRobb, C. McInnes, University of Glasgow, Glasgow, United Kingdom				

Tuesday, 7 January 2020						
247-SCS-4	**Spacecraft Antennas, Reflectors, and Membrane and Soft Good Mechanics**					**Celebration 12**
Chaired by: M. SILVER, MIT Lincoln Laboratory and H. SOLIMAN						
1430 hrs AIAA-2020-0931 **Deployment Behavior of 2-Dimensional Self-Deployable Space Structures with Corrugated Panels** S. Tamura, H. Furuya, Tokyo Institute of Technology, Yokohama, Japan	1500 hrs AIAA-2020-0932 **Surface Accuracy of Viscoelastic Composite Thin-Shell Deployable Reflector Antennas** W. Klimm, K. Kwok, University of Central Florida, Orlando, FL	1530 hrs AIAA-2020-0933 **Integration, Test, and On-Orbit Operation of a Ka-band Parabolic Deployable Antenna (KaPDA) for CubeSats** J. Sauder, N. Chahat, B. Hirsch, R. Hodges, E. Peral, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA; Y. Rahmat-Samii, University of California, Los Angeles, Los Angeles, CA; et al.	1600 hrs AIAA-2020-0934 **Reflector Segments Integrated by a Tension System** G. Greschik, TentGuild Engineering Company, Boulder, CO	1630 hrs AIAA-2020-0935 **Direct Root-Mean-Square Error for Surface Accuracy Evaluation of Large Deployable Mesh Reflectors** S. Yuan, Lawrence Technological University, Southfield, MI; B. Yang, University of Southern California, Los Angeles, CA; H. Fang, Shanghai YS Information Technology Company, Ltd., Shanghai, China	1700 hrs AIAA-2020-0936 **Shape Control of a CFRP Reflector with Two Types of Actuators** K. Wu, China Academy of Space Technology (CAST), Xi'an, China; H. Fang, L. Lan, Y. Zhou, S. Jiang, Shanghai YS Information Technology Company, Ltd., Shanghai, China	

Tuesday, 7 January 2020						
248-SD-7	**High-Speed Fluid-Structure Interaction**					**Celebration 1**
Chaired by: K. D'SOUZA and N. FALKIEWICZ, MIT Lincoln Laboratory						
1430 hrs AIAA-2020-0937 **Impact of High-Temperature Effects on the Aerothermoelastic Behavior of Composite Skin Panels in Hypersonic Flow** D. Huang, Pennsylvania State University, University Park, PA; K. Hanquist, University of Arizona, Tucson, Tucson, AZ	1500 hrs AIAA-2020-0938 **Computational Study of Shock-Boundary Layer Interactions** A. Schemmel, E. Collins, S. Bhushan, M. Bhatia, Mississippi State University, Starkville, MS	1530 hrs AIAA-2020-0939 **Parametric Fluid-structural Interaction Reduced Order Models in Continuous Time Domain for Aeroelastic Analysis of High-speed Vehicles** H. Song, CFD Research Corporation (CFDRC), Huntsville, AL; Y. Wang, University of South Carolina, Columbia, Columbia, SC; K. Pant, CFD Research Corporation (CFDRC), Huntsville, AL	1600 hrs AIAA-2020-0940 **Response of a Thin Panel to Aerothermal Loading at Mach 6** Z. Riley, Universal Technology Corporation, Dayton, OH; R. Perez, Air Force Research Laboratory, Wright-Patterson AFB, OH; D. Ehrhardt, Ehrhardt Engineering, LLC, Monticello, IL	1630 hrs AIAA-2020-0941 **Nonlinear Multibay Panel Flutter Evaluation of Composite Laminates with Curvilinear Fibers** T. Guimarães, Federal University of Uberlândia, Uberlândia, Brazil; D. Rade, Technological Institute of Aeronautics (ITA), São José dos Campos, Brazil; C. Cesnik, University of Michigan, Ann Arbor, Ann Arbor, MI; F. Marques, University of São Paulo, São Carlos, Brazil		

Tuesday, 7 January 2020						
249-SD-8	**Rotorcraft Dynamics**					**Celebration 15**
Chaired by: A. DATTA, University of Maryland, College Park and W. WELSH, Sikorsky Aircraft Corporation						
1430 hrs AIAA-2020-0942 **Aeroelastic Stability Analysis of Coaxial Rotors using Viscous Vortex Particle Method** P. Singh, P. Friedmann, University of Michigan, Ann Arbor, Ann Arbor, MI	1500 hrs AIAA-2020-0943 **Damping of a Laminated Carbon/Epoxy Beam with Carbon Nanotube Interlayers** K. Prakash, E. Smith, C. Bakis, Pennsylvania State University, University Park, PA	1530 hrs AIAA-2020-0944 **Design, Modeling, and Testing of a Fluidic Flexible Matrix Composite Damped Absorber Prototype for Stiff-Inplane Hingeless Rotorcraft Blades** M. Trowbridge, C. Rahn, E. Smith, Pennsylvania State University, University Park, PA	1600 hrs AIAA-2020-0945 **Advanced On-Blade Control for Vibration Reduction of the EC-145 Helicopter: Robust Principal Components vs H-Infinity** H. Yang, J. Alotaibi, R. Morales-Viviescas, University of Leicester, Leicester, United Kingdom			

Tuesday, 7 January 2020						
250-SEN-2	**Sensor Data Processing**					**Celebration 8**
Chaired by: N. NAPOLI and T. FREY, Lockheed Martin Aeronautics						
1430 hrs AIAA-2020-0946 **Terrain Relative Navigation Enhanced with SAR for Moon's Shadowed Regions** M. Hidaka, M. Takahashi, Keio University, Yokohama, Japan; T. Ishida, S. Fukuda, Japan Aerospace Exploration Agency (JAXA), Sagamihara, Japan	1500 hrs AIAA-2020-0947 **Sensor Fusion Of Structural Finite Element Model With Inertial Sensor Data To Measure Wing Deflection Of A Fixed Wing Aircraft** G. Schirmer, J. Steck, Wichita State University, Wichita, KS	1530 hrs AIAA-2020-0948 **Sensor Fusion with Censoring Limits** B. Allik, Army Research Laboratory, Aberdeen Proving Ground, MD	1600 hrs AIAA-2020-0949 **Weighted Adaptive Decentralized Kalman Filters for Fault Tolerance** V. Saini, A. Maity, Indian Institute of Technology Bombay, Mumbai, India			

Tuesday, 7 January 2020						
251-SFM-10	**Rendezvous, Relative Motion, Proximity Missions, and Formation Flying I**					**Bayhill 27**
Chaired by: A. BOWES, NASA Langley Research Center						
1430 hrs AIAA-2020-0950 **Generalized Spacecraft Formation Design through Exploitation of Quasi-Periodic Tori Families** D. Henry, D. Scheeres, University of Colorado, Boulder, Boulder, CO	1500 hrs AIAA-2020-0951 **No Computer Required: Targeting a Rendezvous Burn with Jon Axford's Generalized Intercept Maneuver (GIM) Chart** J. Goodman, Odyssey Space Research, LLC, Houston, TX	1530 hrs AIAA-2020-0952 **Limited Information Pursuit-Evasion Differential Games for Spacecraft Proximity Operations** D. Linville, J. Hess, Air Force Institute of Technology, Wright-Patterson AFB, OH	1600 hrs AIAA-2020-0953 **Six Degree-of-Freedom Hovering over an Asteroid with Unknown Environmental Dynamics via Reinforcement Learning** B. Gaudet, University of Arizona, Tucson, Tucson, AZ; R. Linares, Massachusetts Institute of Technology, Cambridge, MA; R. Furfaro, University of Arizona, Tucson, Tucson, AZ	1630 hrs AIAA-2020-0954 **Design of Spacecraft Swarm Flybys for Planetary Moon Exploration** R. Nallapu, J. Thangavelautham, University of Arizona, Tucson, Tucson, AZ		

Tuesday, 7 January 2020						
252-SFM-11	**Orbital Dynamics, Perturbations, and Stability II**					**Bayhill 28**
Chaired by: N. BOSANAC, University of Colorado Boulder						
1430 hrs AIAA-2020-0955 **Validation of DSST C/C++ against original Fortran version: integration test** J. San Juan, R. López, University of La Rioja, Logroño, Spain; S. Setty, ESA, Darmstadt, Germany; P. Cefola, State University of New York, Buffalo, NY	1500 hrs AIAA-2020-0956 **Dual Quaternions for Perturbed Spacecraft Motion: Applications in Proximity Operations** K. Stanfield, A. Bani Younes, San Diego State University, San Diego, CA	1530 hrs AIAA-2020-0957 **An Adaptive Local Variational Iteration Method for Orbit Propagation and Strongly Nonlinear Dynamical Systems** X. Wang, Texas Tech University, Lubbock, TX; T. Elgohary, University of Central Florida, Orlando, FL; S. Atluri, Texas Tech University, Lubbock, TX	1600 hrs AIAA-2020-0958 **An Adaptive Analytic Continuation Technique for the Computation of the Higher Order State Transition Tensors for the Perturbed Two-Body Problem** T. Tasif, T. Elgohary, University of Central Florida, Orlando, FL			

Tuesday, 7 January 2020						
253-SFM-12	**Space Trajectory Design and Optimization II**					**Bayhill 29**
Chaired by: P. GHOSH, AGI						
1430 hrs AIAA-2020-0959 **Impact of Launch Injection Errors on Orbit-Raising of All-Electric Satellites** N. Bascue, A. Dutta, Wichita State University, Wichita, KS; P. Ghosh, Analytical Graphics, Inc., Exton, PA	1500 hrs AIAA-2020-0960 **Semianalytic Computation of Ballistic Transfers in the Restricted Three-Body Problem** B. Mahajan, Odyssey Space Research, LLC, Houston, TX; G. Condon, NASA Johnson Space Center, Houston, TX; S. Vadali, Texas A&M University, College Station, TX	1530 hrs AIAA-2020-0961 **Tube Stochastic Optimal Control with Imperfect Information: Application to Navigation and Guidance Analyses** K. Kakihara, University of Tokyo, Tokyo, Japan; N. Ozaki, Japan Aerospace Exploration Agency (JAXA), Sagamihara, Japan; A. Ishikawa, T. Chikazawa, R. Funase, University of Tokyo, Tokyo, Japan	1600 hrs AIAA-2020-0962 **Enabling Global Lunar Access for Human Landing Systems Staged at Earth-Moon L2 Southern Near Rectilinear Halo and Butterfly Orbits** Z. May, M. Qu, R. Merrill, NASA Langley Research Center, Hampton, VA	1630 hrs AIAA-2020-0963 **Earth – to – Mars Interplanetary Trajectory Optimization Using Gauss Quadrature Collocation** B. Holden, S. He, A. Rao, University of Florida, Gainesville, Gainesville, FL		

Tuesday, 7 January 2020						
254-STR-8	**Stability and Failure of Structures**					**Celebration 5**
Chaired by: C. BISAGNI, TU Delft and J. MERRET, University of Illinois at Urbana-Champaign						
1430 hrs AIAA-2020-0964 **Axisymmetric Peridynamic Analysis for Simulation of Crack Deflection in Ceramic Matrix Composites** C. Mitts, University of Arizona, Tucson, Tucson, AZ; S. Naboulsi, C. Przybyla, Air Force Research Laboratory, Wright-Patterson AFB, OH; E. Madenci, University of Arizona, Tucson, Tucson, AZ	1500 hrs AIAA-2020-0965 **Inelastic Material Modeling Using Weak form of Peridynamics within MOOSE Framework** E. Madenci, D. Behera, University of Arizona, Tucson, Tucson, AZ	1530 hrs AIAA-2020-0966 **Boundary Collocation Methodology for Buckling of Composite Panels With Damage Zones** S. Russell, Russell Aerostructures Consulting, LLC, Tyler, TX	1600 hrs AIAA-2020-0967 **Peridynamic modeling of perforated structures in a finite element framework** C. Diyaroglu, E. Madenci, University of Arizona, Tucson, Tucson, AZ; N. Phan, Naval Air Systems Command, Patuxent River, MD	1630 hrs AIAA-2020-0968 **Peridynamic Modeling of Damage due to Multiple Sand Particle Impacts in the Presence of Contact and Friction** V. Anicode, C. Diyaroglu, E. Madenci, University of Arizona, Tucson, Tucson, AZ	1700 hrs AIAA-2020-0969 **In-situ neutron diffraction study of micromechanical shear failure in an aerospace composite** B. Wang, K. Seffen, S. Guest, University of Cambridge, Cambridge, United Kingdom; T. Lee, Rutherford Appleton Laboratory, Didcot, United Kingdom; S. Huang, S. Luo, University of Hull, Hull, United Kingdom; et al.	

Tuesday, 7 January 2020						
255-SUR-2/MAT-6	**Survivability - Aerospace Structures and Materials**					**Celebration 14**
Chaired by: M. SCHUCK, SURVICE Engineering Company and W. SCHONBERG, Missouri University of Science and Technology						
1430 hrs AIAA-2020-0970 **Predicting Hydrodynamic RAM Damage in Bonded Composite Tanks Using Progressive Damage Failure Analysis** T. Sedalor, D. Fleming, Florida Institute of Technology, Melbourne, FL	1500 hrs AIAA-2020-0971 **Building Block Approach For Determination of Ballistic Limit of Composite Panels Using Peridynamics** O. Weckner, F. Cuenca, The Boeing Company, Everett, WA; S. Silling, Sandia National Laboratories, Albuquerque, NM	1530 hrs AIAA-2020-0972 **Efficient, Tunable Hydrodynamic Ram Test Facility** M. Ramsey, R. Gilmore, Creare, Inc., Hanover, NH; A. Goss, B. Barlow, 704th Test Group, Wright-Patterson AFB, OH	1600 hrs AIAA-2020-0973 **Modeling Nonlinear Heat Transfer for Pin-on-Disc Sliding System** B. Boardman, R. Uber, W. Baker, A. Palazotto, Air Force Institute of Technology, Wright-Patterson AFB, OH	1630 hrs AIAA-2020-0974 **Composite Material for High-Speed Projectile Outer Casing** A. Beard, A. Palazotto, Air Force Institute of Technology, Wright-Patterson AFB, OH		

Tuesday, 7 January 2020						
256-TF-2	**Applications and Aircraft for Transformational Flight**					**Celebration 13**
Chaired by: M. PATTERSON, NASA Langley Research Center and A. LINN, A. B. Linn PE						
1430 hrs AIAA-2020-0975 **A Multi-Commodity Network Flow Approach for Optimal Flight Schedules for an Airport Shuttle Air Taxi Service** S. Roy, M. Kotwicz, C. Leonard, A. Jha, N. Wang, B. German, Georgia Institute of Technology, Atlanta, GA; et al.	1500 hrs AIAA-2020-0976 **Optimal Placement of Airparks for STOL Urban and Suburban Air Mobility** L. Wei, C. Justin, D. Mavris, Georgia Institute of Technology, Atlanta, GA	1530 hrs AIAA-2020-0977 **Flight Test Results of a Subscale STOL Aircraft** C. Courtin, M. Drela, Massachusetts Institute of Technology, Cambridge, MA	1600 hrs Oral Presentation **Multi-Modal Aircraft for Transformational Inter-City Transportation (Invited)** K. Antcliff, N. Borer, B. Horvath, F. Capristan, NASA Langley Research Center, Hampton, VA	1630 hrs AIAA-2020-0978 **Trajectory Generation for Noise-Constrained Autonomous Flight Operations** K. Ackerman, I. Gregory, NASA Langley Research Center, Hampton, VA	1700 hrs AIAA-2020-0979 **Korea Human Powered Aircraft Competition Lessons Learned** K. Kwon, H. Lee, Inha University, Incheon, South Korea	

Tuesday, 7 January 2020						
257-TP-6	**Theoretical, Experimental and Computational Heat Transfer I**					**Silver Spring I**
Chaired by: D. ZAKAR, NRL and K. ANDERSON, CAL POLY POMONA						
1430 hrs AIAA-2020-0980 **An Analytical Approximation for Temperature Distributions in Micro Pin Fin Arrays** S. Cohen, K. Weed, J. Lambert, Ball Corporation, Westminster, CO	1500 hrs AIAA-2020-0981 **Simultaneous Voltage and Heat Transfer distribution Measurements on an Arc Plasma Wind Tunnel Constrictor** O. Ifergan, Technion–Israel Institute of Technology, Haifa, Israel; M. Berreby, Rafael, Haifa, Israel; D. Greenblatt, Technion–Israel Institute of Technology, Haifa, Israel	1530 hrs AIAA-2020-0982 **Theoretical and Experimental Analysis of Flight-to-Ground Scaling for Axisymmetric and Planar Bodies** D. Leiser, F. Hufgard, S. Loehle, S. Fasoulas, University of Stuttgart, Stuttgart, Germany	1600 hrs AIAA-2020-0983 **Transient Heat Transfer Modeling of a Thermopile Type Planetary Heat Flux Sensor on the Surface of Venus** K. Rivera, K. Anderson, California State Polytechnic University, Pomona, CA; M. Pauken, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA	1630 hrs AIAA-2020-0984 **Effect of Interface Thermal Resistance and Coatings on Hypersonic Heat Flux Reconstruction Schemes** N. Nguyen, L. Massa, Virginia Polytechnic Institute and State University, Blacksburg, VA	1700 hrs AIAA-2020-0985 **Apparent Entropy Production Difference for Numerical Error Characterization** P. Ogban, G. Naterer, Memorial University of Newfoundland, St. John's, Canada	

Tuesday, 7 January 2020

258-UAS-4	UAS Guidance, Navigation, and Control I					Celebration 16
Chaired by: J. WILHELM, Ohio University						
1430 hrs AIAA-2020-0986 **Trajectory-based Agile Multi UAV Coordination through Time Synchronisation** H. Türkmen, O. Shadeed, E. Koyuncu, Istanbul Technical University, Istanbul, Turkey	1500 hrs AIAA-2020-0987 **A Probabilistic Path Planning Framework for Optimizing Feasible Trajectories of Autonomous Search Vehicles Leveraging the Projected-Search Reduced Hessian Method** A. Subramanian, S. Alimohammadi, T. Bewley, P. Gill, University of California, San Diego, San Diego, CA	1530 hrs AIAA-2020-0988 **H_2 Optimal Attitude Estimation of UAVs Using Sensor Fusion** S. Kim, V. Tadiparthi, R. Bhattacharya, Texas A&M University, College Station, TX	1600 hrs AIAA-2020-0989 **Vision Based Relative Navigation for Close-Formation Flight Missions** A. Irigireddy, H. Moncayo, Embry-Riddle Aeronautical University, Daytona Beach, FL			

Tuesday, 7 January 2020

259-WE-4	Wind Turbine Modeling Approaches					Plaza Ballroom D
Chaired by: D. MANIACI, Sandia National Laboratories and R. KING, National Renewable Energy Laboratory						
1430 hrs AIAA-2020-0990 **Comparative Assessment of Finite Element Modeling Techniques for Wind Turbine Rotor Blades** W. Vanskike, R. Hale, University of Kansas, Lawrence, Lawrence, KS	1500 hrs AIAA-2020-0991 **Unsteady and three-dimensional aerodynamic effects on wind turbine rotor loads** A. Muñoz-Simón, A. Wynn, R. Palacios, Imperial College London, London, United Kingdom	1530 hrs AIAA-2020-0992 **Implementation of a pressure based incompressible flow solver in SU2 for wind turbine applications** A. Koodly Ravishankara, H. Ozdemir, TNO, Petten, The Netherlands; E. van der Weide, University of Twente, Enschede, The Netherlands				

Tuesday, 7 January 2020

260-WE-5	Atmospheric Physics and Inflow					Plaza Ballroom D
Chaired by: D. MANIACI, Sandia National Laboratories and R. KING, National Renewable Energy Laboratory						
1430 hrs **No Presentation**			1600 hrs AIAA-2020-0993 **A numerical framework for constraining synthetic wind fields with lidar measurements for improved load simulations** V. Pettas, University of Stuttgart, Stuttgart, Germany; F. Costa García, University of Valencia, Valencia, Spain; M. Kretschmer, University of Stuttgart, Stuttgart, Germany; J. Rinker, Technical University of Denmark, Roskilde, Denmark; A. Clifton, P. Cheng, University of Stuttgart, Stuttgart, Germany	1630 hrs AIAA-2020-0994 **Coriolis effects within and trailing a large finite wind farm** M. Howland, A. Ghate, S. Lele, Stanford University, Stanford, CA	1700 hrs AIAA-2020-0995 **Dynamics of Large Scales Structures in Asymptotically Infinite and Finite-Sized Wind Farms: A Study using Proper Orthogonal Decomposition** T. Chatterjee, Argonne National Laboratory, Lemont, IL; Y. Peet, Arizona State University, Tempe, AZ	

Tuesday, 7 January 2020

261-HUB-3 1500 - 1600 hrs	Aerodynamic: Inside the High-Stakes Global Jetliner EcoSystem	the HUB
Discussion of the $330 Billion commercial aircraft industry by expert/author Kevin Michaels, followed by a signing of his book on the topic.		

Tuesday, 7 January 2020

262-NW-10 1530 - 1600 hrs	Tuesday Afternoon Networking Coffee Break	Exposition Hall

Tuesday, 7 January 2020

263-NW-11 1730 - 1900 hrs	Welcome Happy Hour in the Exposition Hall	Exposition Hall
Enjoy delicious food and beverages while networking with your fellow attendees.		

Wednesday

Wednesday, 8 January 2020

264-SB-3 0730 - 0800 hrs	Wednesday Speaker Briefing	Session Rooms

Wednesday, 8 January 2020

265-PLNRY-3 0800 - 0900 hrs	Igniting Tomorrow: Stories from America's Favorite Museum	Windermere Ballroom

Moderator: Michael Gazarik, Vice President, Engineering, Ball Aerospace

Ellen R. Stofan
John and Adrienne Mars Director
National Air and Space Museum, Smithsonian Institution

Wednesday, 8 January 2020

266-NW-12 0900 - 0930 hrs	Wednesday Morning Networking Coffee Break	Exposition Hall

Wednesday, 8 January 2020

267-AA-5 — **Jet Noise IV** — **Peacock Spring**

Chaired by: J. LIU, NRL and A. LYRINTZIS, Embry Riddle Aeronautical University

0930 hrs AIAA-2020-0996 **Prediction of Scattered Fine-Scale Jet Mixing Noise using Lilley's Acoustic Analogy** A. Carr, S. Miller, University of Florida, Gainesville, Gainesville, FL	1000 hrs AIAA-2020-0997 **Comparison of Modal and Conditional Analyses for Intermittent Phenomena in Jet Noise** M. Akamine, S. Tsutsumi, Japan Aerospace Exploration Agency (JAXA), Sagamihara, Japan; K. Okamoto, University of Tokyo, Kashiwa, Japan; S. Teramoto, University of Tokyo, Tokyo, Japan; S. Nonaka, Japan Aerospace Exploration Agency (JAXA), Sagamihara, Japan	1030 hrs AIAA-2020-0998 **Large eddy simulations of screeching twin rectangular jets** J. Jeun, G. Wu, S. Lele, Stanford University, Stanford, CA	1100 hrs AIAA-2020-0999 **Resolvent-based jet noise models: a projection approach** E. Pickering, California Institute of Technology, Pasadena, CA; A. Towne, University of Michigan, Ann Arbor, Ann Arbor, MI; P. Jordan, University of Poitiers, Poitiers, France; T. Colonius, California Institute of Technology, Pasadena, CA	1130 hrs AIAA-2020-1000 **Coupled LES-Experimental Noise Source Imaging and Fluid-Thermodynamic Mode Decomposition of Supersonic Jets with Fluid Inserts** C. Prasad, S. Hromisin, Pennsylvania State University, University Park, PA		

Wednesday, 8 January 2020

268-ACD-9/AFM-8 — **Formation Flying I** — **Florida Ballroom A**

Chaired by: D. CARTER, Air Force Research Laboratory

0930 hrs AIAA-2020-1001 **Formation Flying (Air-Wake-Surfing) for Efficient Operations – NATO STO Research Task AVT- 279** R. Nangia, University of Bristol, Bristol, United Kingdom; N. Brown, NASA Armstrong Flight Research Center, Edwards, CA	1000 hrs AIAA-2020-1002 **Flight Physics of Fuel-Saving Formation Flight** A. Koloschin, N. Fezans, German Aerospace Center (DLR), Braunschweig, Germany	1030 hrs AIAA-2020-1003 **Flight Control Systems for fuel efficient wake surfing** M. Niestroy, Lockheed Martin Corporation, Fort Worth, TX; R. Luckner, Technical University of Berlin, Berlin, Germany; A. Koloschin, German Aerospace Center (DLR), Braunschweig, Germany; N. Brown, C. Hanson, NASA Armstrong Flight Research Center, Edwards, CA; C. Doll, ONERA, Toulouse, France	1100 hrs AIAA-2020-1004 **Operationalizing Flight Formations for Aerodynamic Benefits** D. Erbschloe, Erbschloe Technical Consulting, Sheridan, WY; D. Carter, G. Dale, Air Force Research Laboratory, Wright-Patterson AFB, OH; C. Doll, ONERA, Paris, France; M. Niestroy, Lockheed Martin Corporation, Fort Worth, TX; T. Marks, German Aerospace Center (DLR), Braunschweig, Germany	1130 hrs AIAA-2020-1005 **Digital Engineering Influences on Formation Flying Technology Development** R. Graves, Air Force Research Laboratory, Wright-Patterson AFB, OH		

Wednesday, 8 January 2020						
269-ACD-10/TF-3	**Vehicle and Propulsor Sizing - Methods and Tools**					**Orlando Ballroom L**
Chaired by: R. VOS, TU Delft fac. Aerospace Engineering and P. MARZOCCA, RMIT University						
0930 hrs AIAA-2020-1006 **A Comparison of Hybrid-Electric Aircraft Sizing Methods** D. Finger, Aachen University of Applied Sciences, Aachen, Germany; R. de Vries, R. Vos, Delft University of Technology, Delft, The Netherlands; C. Braun, Aachen University of Applied Sciences, Aachen, Germany; C. Bil, RMIT University, Melbourne, Australia	1000 hrs AIAA-2020-1007 **Framework for Design Space Exploration of Novel Propulsion System Architectures** A. Harish, J. Gladin, D. Mavris, Georgia Institute of Technology, Atlanta, GA	1030 hrs AIAA-2020-1008 **A First-Principle Power and Energy Model for eVTOL Vehicles** E. Senkans, M. Skuhersky, M. Wilde, B. Kish, Florida Institute of Technology, Melbourne, FL				

Wednesday, 8 January 2020						
270-AFM-9/GNC-16	**Pterodactyl: Control System Design for Deployable Entry Vehicles**					**Bayhill 18**
Chaired by: S. D'SOUZA, NASA-ARC and A. CASSELL, NASA-Ames						
0930 hrs AIAA-2020-1009 **Pterodactyl: Mechanical Designs for Integrated Control Design of a Mechanically Deployable Entry Vehicle** B. Yount, A. Cassell, S. D'Souza, NASA Ames Research Center, Moffett Field, CA	1000 hrs AIAA-2020-1010 **Pterodactyl: Aerodynamic and Aeroheating Database Development for Integrated Control Design of a Mechanically Deployed Entry Vehicle** B. Nikaido, NASA Ames Research Center, Moffett Field, CA; Z. Hays, Analytical Mechanics Associates, Inc., Moffett Field, CA; B. Reddish, University of California, Davis, Davis, CA	1030 hrs AIAA-2020-1011 **Pterodactyl: Development and Performance of Guidance Algorithms for a Mechanically Deployed Entry Vehicle** B. Johnson, NASA Johnson Space Center, Houston, TX; P. Lu, San Diego State University, San Diego, CA; B. Nikaido, Z. Hays, S. D'Souza, NASA Ames Research Center, Moffett Field, CA; R. Sostaric, NASA Johnson Space Center, Houston, TX	1100 hrs AIAA-2020-1012 **Pterodactyl: Development and Comparison of Control Architectures for a Mechanically Deployed Entry Vehicle** W. Okolo, B. Margolis, S. D'Souza, NASA Ames Research Center, Moffett Field, CA; J. Barton, Johns Hopkins University Applied Physics Laboratory, Laurel, MD	1130 hrs AIAA-2020-1013 **Pterodactyl: Thermal Protection System for Integrated Control Design of a Mechanically Deployed Entry Vehicle** Z. Hays, B. Yount, B. Nikaido, J. Tran, S. D'Souza, D. Kinney, NASA Ames Research Center, Moffett Field, CA; et al.	1200 hrs AIAA-2020-1014 **Pterodactyl: Trade Study for an Integrated Control System Design of a Mechanically Deployed Entry Vehicle** A. Alunni, S. D'Souza, B. Yount, W. Okolo, B. Nikaido, B. Margolis, NASA Ames Research Center, Moffett Field, CA; et al.	

Wednesday, 8 January 2020						
271-AFM-10	**Results of the X-56A MUTT Phase-1 Flight Tests**					**Bayhill 19**
Chaired by: J. SCHAEFER, NASA Armstrong Flight Research Center and J. OUELLETTE, NASA Armstrong Flight Research Center						
0930 hrs Oral Presentation **NASA's X-56A MUTT Aeroelastic Demonstrator Project Overview** J. Ouellette, M. Boucher, P. Suh, A. Chin, S. Truong, K. Bhamidipati, NASA Armstrong Flight Research Center, Edwards, CA; et al.	1000 hrs AIAA-2020-1015 **X-56A Structural Dynamics Ground Testing Overview and Lessons Learned** A. Chin, S. Truong, N. Spivey, NASA Armstrong Flight Research Center, Edwards, CA	1030 hrs AIAA-2020-1016 **Generation and Calibration of Linear Models of Aircraft with Highly Coupled Aeroelastic and Flight Dynamics** J. Ouellette, F. Valdez, NASA Armstrong Flight Research Center, Edwards, CA	1100 hrs AIAA-2020-1017 **System Identification of Flexible Aircraft: Lessons Learned from the X-56A Phase 1 Flight Tests** J. Grauer, NASA Langley Research Center, Hampton, VA; M. Boucher, NASA Armstrong Flight Research Center, Edwards, CA	1130 hrs Oral Presentation **Modern Control of the X-56A's Body Freedom Flutter Mode: Flight Test Data Significantly Past Flutter** P. Suh, M. Boucher, J. Schaefer, C. Miller, J. Ouellette, NASA Armstrong Flight Research Center, Edwards, CA		

Wednesday, 8 January 2020						
272-AMT-10	**Velocimetry Techniques I**					**Bayhill 21**
Chaired by: B. THUROW, Auburn University and N. JIANG, Spectral Energies, LLC						
0930 hrs AIAA-2020-1018 **Extending the Frequency Limits of "Postage-Stamp PIV" to MHz Rates** S. Beresh, R. Spillers, M. Soehnel, S. Spitzer, Sandia National Laboratories, Albuquerque, NM	1000 hrs AIAA-2020-1019 **100-kHz PLEET for hypersonic flow velocity measurements in a Mach 6 Ludwieg Tube** P. Hsu, N. Jiang, J. Jewell, J. Felver, S. Roy, Spectral Energies, LLC, Beavercreek, OH; M. Borg, Air Force Research Laboratory, Wright-Patterson AFB, OH; et al.	1030 hrs AIAA-2020-1020 **Tailoring FLEET for Cold Hypersonic Flows** Y. Zhang, D. Richardson, S. Beresh, K. Casper, M. Soehnel, R. Spillers, Sandia National Laboratories, Albuquerque, NM; et al.	1100 hrs AIAA-2020-1021 **Investigation of Doppler Lidar for Velocity Measurements in Wind Tunnels** S. Barnhart, S. Gunasekaran, University of Dayton, Dayton, OH	1130 hrs AIAA-2020-1022 **Experimental Assessment of Wavelet-based Optical Flow Velocimetry (wOFV) as Applied to Tracer Particle Images from Free Shear Flows** W. Page, B. Schmidt, J. Sutton, Ohio State University, Columbus, OH	1200 hrs AIAA-2020-1023 **An improved view registration method and its application in laser imaging measurements** B. Hu, Saint Paul's School, Concord, NH; L. Ma, University of Virginia, Charlottesville, Charlottesville, VA	

Wednesday, 8 January 2020						
273-APA-21	**Special Session: Slotted, Natural-Laminar-Flow Airfoil Development from the NASA University Leadership Initiative I**					**Florida Ballroom C**
Chaired by: J. CODER, University of Tennessee and K. GROOT, Delft University of Technology						
0930 hrs Oral Presentation **Design and Analysis of a Slotted, Natural-Laminar-Flow Airfoil for Commercial Transport Aircraft** D. Somers, Airfoils, Inc., Port Matilda, PA; J. Coder, University of Tennessee, Knoxville, Knoxville, TN	1000 hrs AIAA-2020-1024 **Boundary-Layer Stability of a Natural-Laminar-Flow Airfoil** K. Groot, E. Beyak, D. Heston, H. Reed, Texas A&M University, College Station, TX	1030 hrs AIAA-2020-1025 **Progress on Aerodynamic Performance Analysis of SNLF Transonic Truss-Braced Wing** P. Camacho, K. Pham, L. Chou, N. Harrison, A. Khodadoust, The Boeing Company, Huntington Beach, CA	1100 hrs AIAA-2020-1026 **Design of a Slotted, Natural-Laminar-Flow Airfoil for Transition Validation Experiments** J. Coder, University of Tennessee, Knoxville, Knoxville, TN	1130 hrs AIAA-2020-1027 **Experiential Learning for Engineering Students through Educational Outreach and Leadership** E. Long, H. Goertz, S. TerMaath, J. Coder, University of Tennessee, Knoxville, Knoxville, TN		

Wednesday, 8 January 2020						
274-APA-22	**Propeller Aerodynamics**					**Celebration 2**
Chaired by: M. GHOREYSHI, United States Air Force Academy and D. HUNSAKER, Utah State University						
0930 hrs AIAA-2020-1028 **Propeller Partial Ground Effect** J. Cai, S. Gunasekaran, University of Dayton, Dayton, OH; A. Ahmed, Auburn University, Auburn, AL; M. Ol, Folderol, LLC, Dayton, OH	1000 hrs AIAA-2020-1029 **Aerodynamic Performance and Interaction Effects of Circular and Square Ducted Propellers** H. Bento, R. de Vries, L. Veldhuis, Delft University of Technology, Delft, The Netherlands	1030 hrs AIAA-2020-1030 **Unsteady Numerical Simulation on Angle-of-Attack Effects of Tractor-Propeller/Wing and Pusher-Propeller/Wing Interactions** Y. Furusawa, K. Kitamura, Yokohama National University, Yokohama, Japan				

Wednesday, 8 January 2020						
275-APA-24	**Advanced Computational Methods for Aerodynamics II**					**Coral Spring I**
Chaired by: K. EKICI, University of Tennessee and A. VOEGELE, The Aerospace Corporation						
0930 hrs AIAA-2020-1031 **Calibration of an extended Eddy Viscosity Turbulence Model using Uncertainty Quantification** G. Subbian, A. Botelho e Souza, R. Radespiel, E. Zander, N. Friedman, T. Moshagen, Technical University of Braunschweig, Braunschweig, Germany; et al.	1000 hrs AIAA-2020-1032 **Turbulence Modeling for Leading-Edge Vortices: an Enhancement based on Experimental Data** M. Moioli, C. Breitsamter, Technical University of Munich, Garching, Germany; K. Sørensen, Airbus, Manching, Germany	1030 hrs AIAA-2020-1033 **Recent Developments in Fun3D and LoCi/CHEM CFD Codes Towards Multiphysics Modeling** A. Jirasek, J. Saidel, U.S. Air Force Academy, Colorado Springs, CO	1100 hrs AIAA-2020-1034 **Assessment of Transition Modeling Capability in OVERFLOW with Emphasis on Swept-Wing Configurations** B. Venkatachari, P. Paredes, National Institute of Aerospace, Hampton, VA; J. Derlaga, P. Buning, M. Choudhari, F. Li, NASA Langley Research Center, Hampton, VA; et al.	1130 hrs AIAA-2020-1035 **Database Approach for Laminar-Turbulent Transition Prediction on Heated Wall** J. Saint-James, H. Deniau, O. Vermeersch, E. Piot, ONERA, Toulouse, France		

Wednesday, 8 January 2020						
276-AS-3	**Morphing Structures I**					**Celebration 4**
Chaired by: H. MONNER, DLR - German Aerospace Center and F. GANDHI, Rensselaer Polytechnic Inst						
0930 hrs AIAA-2020-1036 **Displacement Controlled 2D Compliant Mechanisms for use in Morphing Structures** E. Munroe, R. Bohrer, I. Kim, Queen's University, Kingston, Canada; W. Chishty, National Research Council Canada, Ottawa, Canada	1000 hrs AIAA-2020-1037 **Control force required to morph the elbow and wrist in gulls** C. Harvey, University of Michigan, Ann Arbor, Ann Arbor, MI; V. Baliga, University of British Columbia, Vancouver, Canada; D. Inman, University of Michigan, Ann Arbor, Ann Arbor, MI	1030 hrs AIAA-2020-1038 **An analytical model for granular jamming beams with applications in morphing aerostructures** J. Brigido, S. Burrow, B. Woods, University of Bristol, Bristol, United Kingdom	1100 hrs AIAA-2020-1039 **On-Demand Stiffening of Deflected Morphing Section via Internal Bistable Element** J. Rivas-Padilla, D. Boston, A. Arrieta, Purdue University, West Lafayette, IN	1130 hrs AIAA-2020-1040 **Aerostructural and Aeroacoustic Experimental Testing of Shape Memory Alloy Slat Cove Filler** A. Leaton, W. Scholten, K. Lieb, D. Hartl, T. Strganac, Texas A&M University, College Station, TX; T. Turner, NASA Langley Research Center, Hampton, VA		

Wednesday, 8 January 2020

277-CASE-3 0930 - 1130 hrs	Art in Engineering for Complex Aerospace Systems	Plaza Ballroom I

Aerospace systems engineering has evolved into a practice with large hierarchical organizations, extensive sets of rigorous requirements, policies from management to verification, and budgets that can reach billions of dollars. Many of the approaches and methods that aerospace engineering has evolved to practicing contrast with approaches and methods used to engineer non-aerospace, more artistically oriented systems. This panel, with encouraged audience participation, will consist of leading management and engineering practitioners of non-aerospace systems including social media, themed entertainment, and retail. The practices involved in the creation of non-aerospace systems will be discussed to provide possible methods and approaches that could be adopted by aerospace practitioners.

Moderators: Bryan Mesmer, University of Alabama in Huntsville and Alejandro Salado, Virginia Polytechnic Institute and State University

Panelists:

Jackie Wolford
Director, Design Studio
AOA

Oksana Wall
Director, Themed Entertainment
AOA

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278-EDU-4 0930 - 1230 hrs	Aerospace Education Panel	Plaza Ballroom F

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279-F360-5 0930 - 1130 hrs	Forum 360: Connecting Faster	Regency Ballroom Q

Moderator: Ed Waggoner, Director, Integrated Aviation Systems Program, Aeronautics Research Mission Directorate, NASA

Panelists:

Erik Axdahl
Chief Engineer, High Speed Transport
The Spaceship Company

Kevin Bowcutt
Senior Technical Fellow
Chief Scientist of Hypersonics
The Boeing Company

Stephen Frick
Director of Operations, Company Advanced Technology Center
Lockheed Martin Space

Eric Kaduce
Director, Boeing/Aerion Supersonic Business Jet Joint Venture
The Boeing Company

AJ Piplica
Chief Executive Officer and Founder
Hermeus

Joe Wilding
Chief Technology Officer and Co-Founder
Boom Technology, Inc.

Wednesday, 8 January 2020

280-FD-39	Special Session: Surging and Surging/Pitching Aerodynamics I					Plaza Ballroom H

Chaired by: D. GREENBLATT, Technion - Israel Institute of Technology and O. SAHNI, Rensselaer Polytechnic Institute

0930 hrs Oral Presentation **Viscous Effects on Unsteady Airfoil Loading in a Surging Flow** J. Gregory, Ohio State University, Columbus, OH	1000 hrs Oral Presentation **The effect of wake deformation on the lift dynamics of a surging airfoil** H. Taha, University of California, Irvine, Irvine, CA	1030 hrs Oral Presentation **Dynamic Large Eddy Simulation of Flow Over Surging Airfoils at Different Reynolds Numbers and Advance Ratios** J. Rane, O. Sahni, Rensselaer Polytechnic Institute, Troy, NY	1100 hrs Oral Presentation **Added mass forces and vorticity in pitching and surging wings** H. Babinsky, University of Cambridge, Cambridge, United Kingdom	1130 hrs Oral Presentation **Quasi-steady behavior in the wake of a streamwise-oscillating cylinder** M. Shamai, California Institute of Technology, Pasadena, CA; S. Dawson, Illinois Institute of Technology, Chicago, IL; I. Mezic, University of California, Santa Barbara, Santa Barbara, CA; B. McKeon, California Institute of Technology, Pasadena, CA		

Wednesday, 8 January 2020

281-FD-40	Boundary Layer Transition (BOLT) Flight Experiment Pre-Flight Research I					Orlando Ballroom M

Chaired by: T. JULIANO, University of Notre Dame and D. ARAYA, The Johns Hopkins University Applied Physics Laboratory

0930 hrs Oral Presentation **Introduction to the Boundary Layer Transition (BOLT) Flight Experiment** I. Leyva, Air Force Office of Scientific Research, Arlington, VA	1000 hrs AIAA-2020-1041 **Final Design of the Boundary Layer Transition (BOLT) Flight Experiment** B. Wheaton, D. Berridge, T. Wolf, D. Araya, R. Stevens, B. McGrath, Johns Hopkins University Applied Physics Laboratory, Laurel, MD; et al.	1030 hrs AIAA-2020-1042 **Effect of steady forcing on BoLT flowfield for flight Reynolds numbers** J. Thome, J. Reinert, G. Candler, University of Minnesota, Twin Cities, Minneapolis, MN	1100 hrs AIAA-2020-1043 **Hypersonic Boundary Layer Off-Body and Surface Measurements on the AFOSR BOLT Geometry** H. Kostak, R. Bowersox, Texas A&M University, College Station, TX			

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282-FD-41	CFD Methods V					Rainbow Spring II
Chaired by: J. DERLAGA, NASA Langley Research Center and N. TICHENOR, Texas A&M University						
0930 hrs AIAA-2020-1044 **Implementation of Acceleration Source Term in FUN3D** N. Ahmad, J. Carlson, C. Streett, R. Biedron, NASA Langley Research Center, Hampton, VA	1000 hrs AIAA-2020-1045 **Recent Progress in OVERFLOW Convergence Improvements** J. Derlaga, C. Jackson, P. Buning, NASA Langley Research Center, Hampton, VA	1030 hrs AIAA-2020-1046 **Heterogeneous Computing of CFD Applications on CPU-GPU Platforms using OpenACC Directives** W. Xue, C. Roy, Virginia Polytechnic Institute and State University, Blacksburg, VA	1100 hrs AIAA-2020-1047 **Error Transport Equation Implementation in the SENSEI CFD Code** H. Wang, W. Xue, C. Roy, Virginia Polytechnic Institute and State University, Blacksburg, VA	1130 hrs AIAA-2020-1048 **Stability of Energy Stable Flux Reconstruction for the Diffusion Problem using Compact Numerical Fluxes on Quadratic Elements** S. Quaegebeur, A. Cicchino, S. Nadarajah, McGill University, Montréal, Canada		

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283-FD-42	Fluid Structure Interactions III					Blue Spring I
Chaired by: M. ZAHR, University of Notre Dame and K. BREUER						
0930 hrs AIAA-2020-1049 **Deformation, forces, and flows associated with extremely compliant membrane disks** A. Das, V. Mathai, K. Breuer, Brown University, Providence, RI	1000 hrs AIAA-2020-1050 **A Numerical Investigation of Parachute Deployment in Supersonic Flow** J. Boustani, NASA Ames Research Center, Moffett Field, CA; G. Anugrah, University of Kentucky, Lexington, Lexington, KY; M. Barad, C. Kiris, NASA Ames Research Center, Moffett Field, CA; C. Brehm, University of Kentucky, Lexington, Lexington, KY	1030 hrs AIAA-2020-1051 **Assessment of Mesh Resolution Requirements for Adaptive High-Order Fluid Structure Interaction Simulations** V. Ojha, K. Fidkowski, C. Cesnik, University of Michigan, Ann Arbor, Ann Arbor, MI; P. Beran, N. Wukie, Air Force Research Laboratory, Wright-Patterson AFB, OH	1100 hrs AIAA-2020-1052 **Non-Linear Stability Boundaries of an Elastically-Mounted Pitching Wing** Y. Zhu, Y. Su, K. Breuer, Brown University, Providence, RI			

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284-FD-43	Wing-Gust Interactions I					Blue Spring II
Chaired by: J. BAEDER, University of Maryland and J. VASILE, U. S. Army Research Laboratory (APG)						
0930 hrs AIAA-2020-1053 **Split Velocity Method Application to a Flat Plate Response in Large-Amplitude Sharp-Edged Gusts** C. Badrya, J. Baeder, University of Maryland, College Park, College Park, MD	1000 hrs AIAA-2020-1054 **Influence of Wake Interference and Freestream Turbulence on Airfoil Performance in the Cylinder-Airfoil Configuration** J. Lefebvre, A. Jones, University of Maryland, College Park, College Park, MD	1030 hrs AIAA-2020-1055 **Application of the Energized-Mass Concept to Describe Gust-Body Interactions** J. Galler, D. Rival, Queen's University, Kingston, Canada; G. Weymouth, University of Southampton, Southampton, United Kingdom	1100 hrs AIAA-2020-1056 **The Unsteady Aerodynamics of a Transverse Wing-Gust Encounter with Closed-Loop Pitch Control** G. Sedky, University of Maryland, College Park, College Park, MD; F. Lagor, State University of New York, Buffalo, NY; A. Jones, University of Maryland, College Park, College Park, MD	1130 hrs AIAA-2020-1057 **Negating Gust Effects by Actively Pitching a Wing** I. Andreu Angulo, H. Babinsky, University of Cambridge, Cambridge, United Kingdom		

Wednesday, 8 January 2020

285-FD-44	Flow Control IV					Plaza Ballroom K
Chaired by: R. WOSZIDLO, The Boeing Company and J. SEIDEL, USAF Academy						
0930 hrs AIAA-2020-1058 **Numerical Investigation of NASA Hump Using Co-flow Jet for Separation Control** K. Xu, Y. Ren, G. Zha, University of Miami, Coral Gables, FL	1000 hrs AIAA-2020-1059 **Stereoscopic PIV of Supersonic Flow Past an Ogive-Cylinder in the Presence of Off-Axis Laser Energy Deposition** A. Pournadali Khamseh, R. Kiriakos, E. DeMauro, Rutgers University, Piscataway, NJ	1030 hrs AIAA-2020-1060 **Numerical Investigation of Coflow Jet Active Flow Control 3D Swept Cylinders** J. Boling, Y. Yang, G. Zha, University of Miami, Coral Gables, FL; C. Zeune, Air Force Research Laboratory, Wright-Patterson AFB, OH	1100 hrs AIAA-2020-1061 **Active Forcing of a Pressure-Induced Turbulent Separation Bubble** A. Mohammed-Taifour, A. Le Floc'h, Polytechnique Montréal, Montréal, Canada; J. Weiss, Technical University of Berlin, Berlin, Germany			

Wednesday, 8 January 2020						
286-FD-45	**Hypersonic and Non-Equilibrium Flows II**					**Rock Spring I & II**
Chaired by: L. DUAN, The Ohio State University and D. CUPPOLETTI, University of Cincinnati						
0930 hrs AIAA-2020-1062 **GPU-accelerated Large Eddy Simulation of Hypersonic Flows** S. Terrana, C. Nguyen, J. Peraire, Massachusetts Institute of Technology, Cambridge, MA	1000 hrs AIAA-2020-1063 **Velocity-space Hybridization of DSMC and a Boltzmann Solver** G. Oblapenko, D. Goldstein, P. Varghese, University of Texas, Austin, Austin, TX; C. Moore, Sandia National Laboratories, Albuquerque, NM	1030 hrs AIAA-2020-1064 **Expansion Tube Freestream Disturbance Measurements using a Focused Laser Differential Interferometer** J. Lawson, J. Austin, California Institute of Technology, Pasadena, CA	1100 hrs AIAA-2020-1065 **Direct Numerical Simulation of Turbulent Pressure Fluctuations over a Cone at Mach 8** L. Duan, Ohio State University, Columbus, OH; K. Casper, R. Wagnild, N. Bitter, Sandia National Laboratories, Albuquerque, NM			

Wednesday, 8 January 2020						
287-FD-46	**Modal Analysis of Fluid Flows**					**Plaza Ballroom J**
Chaired by: K. DURAISAMY and M. HASAN, New Mexico State University						
0930 hrs AIAA-2020-1066 **Sparse Generalized Finite Element Methods for Modal Decomposition of Complex Physical Systems** R. Deshmukh, S. Tripathi, J. McNamara, Ohio State University, Columbus, OH	1000 hrs AIAA-2020-1067 **On the Importance of Numerical Error in Constructing POD-based Reduced-Order Models of Nonlinear Fluid Flows** M. Lee, E. Dowell, Duke University, Durham, NC	1030 hrs AIAA-2020-1068 **Extraction of DMD modes from Pulse-Burst PIV Data of Flow over an Open Cavity** S. Singh, L. Ukeiley, University of Florida, Gainesville, Gainesville, FL; L. Cattafesta, Florida State University, Tallahassee, FL; K. Taira, University of California, Los Angeles, Los Angles, CA	1100 hrs AIAA-2020-1069 **Modal Analysis of a Mach 1.5 Underexpanded Jet using Time-Resolved Optical Diagnostics** T. Price, M. Gragston, P. Kreth, University of Tennessee, Tullahoma, Tullahoma, TN	1130 hrs AIAA-2020-1070 **A novel surrogate model for emulation of bi-fluid swirl injector flow dynamics** Y. Li, Georgia Institute of Technology, Atlanta, GA; X. Wang, Florida Institute of Technology, Melbourne, FL; Y. Chang, P. Milan, V. Yang, Georgia Institute of Technology, Atlanta, GA	1200 hrs AIAA-2020-1071 **Thermoacoustic Coupling Mechanism of Combustion Instability in a Continuously Variable Resonance Combustor** H. Koizumi, Mizuho Information & Research Institute, Chiyoda, Japan; S. Tsutsumi, N. Omata, T. Shimizu, Japan Aerospace Exploration Agency (JAXA), Sagamihara, Japan	

Wednesday, 8 January 2020						
288-FD-47	**RANS/LES/Hybrid Turbulence Modeling and Applications I**					**Rainbow Spring I**
Chaired by: S. HEINZ, University of Wyoming and R. AGARWAL, Washington University in St Louis						
0930 hrs AIAA-2020-1072 **Hybrid RANS-LES Derived From Theory** S. Heinz, University of Wyoming, Laramie, Laramie, WY	1000 hrs AIAA-2020-1073 **Application of Mode-Controlled Hybrid RANS-LES** S. Heinz, R. Mokhtarpoor, M. Stoellinger, University of Wyoming, Laramie, Laramie, WY	1030 hrs AIAA-2020-1074 **Adaptive Determination of the Wall Modeled Region in WMLES** A. Kahraman, J. Larsson, University of Maryland, College Park, College Park, MD	1100 hrs AIAA-2020-1075 **A New Improved One-Equation Turbulence Model Based on k-kL Closure** S. Shuai, R. Agarwal, Washington University in St. Louis, St. Louis, MO	1130 hrs AIAA-2020-1076 **Non-Equilibrium Wall Modeling for Large Eddy Simulation of Stalled Iced Airfoils** T. Dzanic, J. Oefelein, Georgia Institute of Technology, Atlanta, GA		

Wednesday, 8 January 2020						
289-GNC-17/IS-8	**Advances in Adaptive Control for Aerospace Systems III (Invited)**					**Celebration 9**
Chaired by: T. YUCELEN, University of South Florida and K. DOGAN						
0930 hrs AIAA-2020-1077 **Distributed Stabilization of Interconnected Linear Multiagent Systems with Adaptive Decoupling under Cooperative Finite Excitation (Invited)** V. Rezaei, M. Stefanovic, University of Denver, Denver, CO	1000 hrs AIAA-2020-1078 **Modeling and Control of Uncertain Hybrid Structure Flexible, Morphing Wings with Stability and Performance Guarantees (Invited)** A. Menon, Wichita State University, Wichita, KS; A. Chakravarthy, University of Texas, Arlington, Arlington, TX; B. Gruenwald, Army Research Laboratory, Aberdeen Proving Ground, MD; T. Yucelen, University of South Florida, Tampa, FL; J. Steck, Wichita State University, Wichita, KS	1030 hrs AIAA-2020-1079 **Dynamic Stability And Adaptive Control of Networked Evolving Formations with Weak Nonlinearities (Invited)** V. Gehlot, M. Balas, University of Tennessee, Knoxville, Tullahoma, TN; S. Bandyopadhyay, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA	1100 hrs AIAA-2020-1080 **Output Feedback Model Reference Adaptive Control in the Presence of Actuator Dynamics (Invited)** S. Ristevski, K. Dogan, T. Yucelen, University of South Florida, Tampa, FL; J. Muse, Air Force Research Laboratory, Wright-Patterson AFB, OH	1130 hrs AIAA-2020-1081 **Experimental Results of a Model Reference Adaptive Control Approach on an Interconnected Uncertain Dynamical System (Invited)** K. Cespedes, K. Dogan, E. Yildirim, T. Yucelen, University of South Florida, Tampa, FL; B. Gruenwald, Army Research Laboratory, Aberdeen Proving Ground, MD; A. Chakravarthy, University of Texas, Arlington, Arlington, TX		

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290-GNC-18 — **Aircraft Control During Landing and Transition Phases** — **Bayhill 17**

Chaired by: M. RAFI, Wichita State University and C. ELLIOTT, Lockheed Martin Aeronautics

0930 hrs
AIAA-2020-1082
Adaptive Control for Attitude Match Station-Keeping and Landing of a Fixed-Wing UAV onto a Maneuvering Platform
J. Pravitra, Georgia Institute of Technology, Atlanta, GA; E. Johnson, Pennsylvania State University, University Park, PA

1000 hrs
AIAA-2020-1083
Testing and Evaluation of a Vision-Augmented Navigation System for Automatic Landings of General Aviation Aircraft
C. Krammer, C. Mishra, F. Holzapfel, Technical University of Munich, Garching, Germany

1030 hrs
AIAA-2020-1084
Design and Evaluation of Vertical Situation Display Reflecting Configuration Changes
A. van Geel, C. Borst, M. van Paassen, M. Mulder, Delft University of Technology, Delft, The Netherlands

1100 hrs
AIAA-2020-1085
Flight Simulator Investigation of Continuously Moving Highlift Devices During Landing Approaches
P. Eichhorn, R. Luckner, Technical University of Berlin, Berlin, Germany

1130 hrs
AIAA-2020-1086
Comparative Study of Sensor Combinations for Autonomous Landing of Fixed-Wing Unmanned Aircraft
J. Koh, Imperial College London, London, United Kingdom; A. Paranjape, Tata Consultancy Services, Ltd., Pune, India

1200 hrs
AIAA-2020-1087
Disturbance Observer-Based Pitch Autopilot for Morphing UAV during Transition Phase
S. Jung, J. Lee, S. Kim, H. Lee, Y. Kim, Seoul National University, Seoul, South Korea

Wednesday, 8 January 2020

291-GNC-19 — **Intelligent/Autonomous Aerial Systems II** — **Bayhill 32**

Chaired by: A. L'AFFLITTO, Virginia Polytechnic Institute and State University and J. CONNOLLY, NASA Glenn Research Center

0930 hrs
AIAA-2020-1088
Modified Nonlinear Traveling Salesman Problem with Delivery Time Windows and Item Constraints
S. Stephens, R. Grandhi, D. Kunz, Air Force Institute of Technology, Wright-Patterson AFB, OH

1000 hrs
AIAA-2020-1089
A Multi-Armed Bandit Approach to Atmospherically-Aware Altitude Optimization
J. Bird, University of Colorado, Boulder, Boulder, CO; J. Langelaan, Pennsylvania State University, University Park, PA

1030 hrs
AIAA-2020-1090
Proactive Data-driven UAV State Estimation via Online End-to-end Learning
H. Zhan, Y. Cao, M. Cortez, A. Harris, University of Texas, San Antonio, San Antonio, TX

1100 hrs
AIAA-2020-1091
Drone Inspection Flight Path Generation from 3D CAD Models: Power Plant Boiler Case Study
A. Ortega, J. Reyes Muñoz, M. McGee, A. Choudhuri, A. Flores-Abad, University of Texas, El Paso, El Paso, TX

1130 hrs
AIAA-2020-1092
Guidance Using Multiple Sequential Line-of-Sight Information
S. Suresh, A. Ratnoo, Indian Institute of Science, Bengaluru, India

1200 hrs
AIAA-2020-1093
On Obstacle Avoidance Characteristics of Proportional Navigation Guidance
F. Savvas Sadiq Ali, P. Tekade, A. Ratnoo, Indian Institute of Science, Bengaluru, India

Wednesday, 8 January 2020

292-GNC-20 — **Navigation, Estimation, Sensing, and Tracking I** — **Bayhill 33**

Chaired by: S. KRISHNASWAMY, Ohio State University

0930 hrs
AIAA-2020-1094
BeiDou Side-lobe Signal Performance Analysis and its Potential Applications for High Orbital Missions
K. Lin, X. Zhan, J. Huang, R. Yang, Shanghai Jiao Tong University, Shanghai, China

1000 hrs
AIAA-2020-1095
BepiColombo Gravity and Rotation Experiment in a Pseudo Drag-Free System
P. Cappuccio, A. Di Ruscio, L. Iess, M. Mariani, University of Rome "La Sapienza", Rome, Italy

1030 hrs
AIAA-2020-1096
A Higher Dimensional Tensor Decomposition Framework for Data Association in LEO Tracking
S. Krishnaswamy, M. Kumar, Ohio State University, Columbus, OH

1100 hrs
AIAA-2020-1097
Spacecraft Attitude Determination using Terrestrial Illumination Matching
L. Shockley, R. Bettinger, Air Force Institute of Technology, Wright-Patterson AFB, OH

1130 hrs
AIAA-2020-1098
Space Object Attitude Determination from Multispectral Light Curves
A. Dianetti, J. Crassidis, State University of New York, Amherst, NY

1200 hrs
AIAA-2020-1099
Navigation for a Spacecraft by using the modified estimator
T. Ichikawa, Japan Aerospace Exploration Agency (JAXA), Sagamihara, Japan

Wednesday, 8 January 2020

293-GNC-21 — **Spacecraft and Launch Guidance, Navigation, and Control I** — **Bayhill 31**

Chaired by: M. MCFARLAND, Raytheon and L. MASSOTTI, European Space Agency (ESA)

0930 hrs
AIAA-2020-1100
Sliding Mode Control Toolbox for Aerospace Applications: Relative Degree Approach
S. Kode, D. Yuri, University of Alabama, Huntsville, Huntsville, AL

1000 hrs
AIAA-2020-1101
Control Momentum Gyroscope Steering Law for Box-90 Array with Performance Guarantees
D. Elliott, M. Peck, Cornell University, Ithaca, NY; I. Nesnas, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA

1030 hrs
AIAA-2020-1102
Seeker Cubesat Control System
E. Gambone, NASA Johnson Space Center, Houston, TX

1100 hrs
AIAA-2020-1103
Robust Control of a Conventional Aeroelastic Launch Vehicle
E. Mooij, Delft University of Technology, Delft, The Netherlands

1130 hrs
AIAA-2020-1104
Passification-Based Adaptive Control of Spacecraft with Elastic Appendages
K. Lee, Catholic Kwandong University, Gangneung, South Korea; S. Singh, University of Nevada, Las Vegas, Las Vegas, NV

1200 hrs
AIAA-2020-1105
Nonlinear Optimal Approach to Magnetic Spacecraft Attitude Control
E. Sharifi, C. Damaren, University of Toronto, Toronto, Canada

Wednesday, 8 January 2020

294-GT-5 — **National Partnership for Aeronautics Mini Facilities User Meeting (Mini-FUM)** — **Plaza Ballroom E**

0930 - 1230 hrs

Panelists will discuss the state of and challenges facing ground test facilities in the United States.

Wednesday, 8 January 2020

295-GTE-9 0930 - 1130 hrs	Supercritical CO2 Combustion Fundamentals	Barrel Spring I

Prof. Subith Vasu (University of Central Florida) will give a tutorial that will present fundamentals and review of recent efforts in the development and validation of a combustion chemical kinetic mechanism for sCO2 oxy- methane/syngas combustion that can be used for computational fluid dynamic code (CFD) simulations in sCO2 oxy-combustion development. The research and technology development for direct-fired supercritical CO2 (sCO2) power plants is gaining attention in academic institutions and industries in USA and other countries, due to its incredible theoretical promise of cycle efficiency, compactness and eco-friendliness. Typical gas-phase combustion models for fuels (methane, syngas, etc.) have been validated for gas turbine conditions – pressures below 40 atm and in fuel/air combustion- and cannot be extended to the operating conditions of sCO2 combustors. Recent models are created by incorporating real gas and solvent effects on combustion process using quantum chemical and molecular dynamic investigations. Validation is carried out using unique experiments conducted in CO2 diluted methane/syngas mixtures and for pressures up to 300 bar. Challenges with coupling the mechanism to combustion CFD codes will be discussed. Such codes enable us to study a variety of topics regarding direct-fired sCO2 oxy-methane/syngas combustors and will be highly valuable and accurate tool for computer design optimization of next generation sCO2 combustors.

Wednesday, 8 January 2020

296-HSABP-5	Special Session: Stratospheric Flying Opportunities for High-Speed Propulsion (STRATOFLY) Project	Plaza Ballroom G

Chaired by: T. SMITH, Boeing Engineering Operations & Technology and R. MOEHLENKAMP, Aerojet Rocketdyne

0930 hrs AIAA-2020-1106 **Design and integration of a cryogenic propellant subsystem for the hypersonic STRATOFLY MR3 Vehicle** R. Fusaro, N. Viola, Technical University of Turin, Turin, Italy	1000 hrs AIAA-2020-1107 **Structural scheme for the propulsion systems and the complete hypersonic STRATOFLY vehicle** M. Rodriguez-Segade, S. Hernandez, J. Diaz, A. Baldomir, D. Lopez, University of A Coruña, A Coruña, Spain	1030 hrs AIAA-2020-1108 **Thermodynamic efficiency analysis and investigation of exergetic effectiveness of STRATOFLY aircraft propulsion plant** A. Ispir, P. Goncalves, B. Saracoglu, von Kármán Institute for Fluid Dynamics, Rhode-Saint-Genèse, Belgium	1100 hrs AIAA-2020-1109 **Large Eddy Simulations of the LAPCAT-II and the SSFE Combustor Configurations** C. Fureby, Swedish Defense Research Agency (FOI), Stockholm, Sweden			

Wednesday, 8 January 2020

297-HUB-4 0930 - 1000 hrs	SmartSat: A Modern Software-defined Satellite Architecture	the HUB

A Lockheed Martin internally-developed infrastructure, middleware, and lower level drivers to create a modular, open software architecture that is abstracted from onboard avionics. This framework consists of services that provide common solutions for all different types of satellite platforms.

Wednesday, 8 January 2020

298-IS-9	Human-Automation Interaction	Celebration 10

Chaired by: D. SELVA, Texas A&M University

0930 hrs AIAA-2020-1110 **The Effects of Training Methodology on Performance, Workload, and Trust During Human Learning of a Computer-Based Task** S. O'Meara, J. Karasinski, C. Miller, S. Joshi, S. Robinson, University of California, Davis, Davis, CA	1000 hrs AIAA-2020-1111 **Integration of Mental Resources in the Planning of Manned-Unmanned Teaming Missions: Concept, Implementation and Evaluation** F. Heilemann, F. Hollatz, Technical University of Munich, Munich, Germany	1030 hrs AIAA-2020-1112 **UAV Haptic Interface for Dynamic Obstacle Avoidance** T. Piessens, M. van Paassen, M. Mulder, Delft University of Technology, Delft, The Netherlands	1100 hrs AIAA-2020-1113 **Analyzing Natural Language Context in Human-Machine Teaming using Supervised Machine Learning** B. Barrows, L. Le Vie, NASA Langley Research Center, Hampton, VA; E. Meszaros, Brown University, Providence, RI; J. Ecker, B. Allen, NASA Langley Research Center, Hampton, VA	1130 hrs AIAA-2020-1114 **Effects of Grid Cell Size in Altitude Control in an Augmented Reality Terrain Display** D. Da Silva Rosa, Delft University of Technology, Delft, The Netherlands; J. Ernst, German Aerospace Center (DLR), Braunschweig, Germany; C. Borst, M. van Paassen, M. Mulder, Delft University of Technology, Delft, The Netherlands		

Wednesday, 8 January 2020

299-IS-10	Adaptive and Intelligent Control Systems I	Celebration 11

Chaired by: N. NEOGI, NASA Langley Research Center and J. VALASEK, Texas A&M University

0930 hrs AIAA-2020-1115 **Control of Multiagent Systems with Local and Global Objectives: Experimental Results** E. Yildirim, S. Sarsilmaz, D. Tran, T. Yucelen, University of South Florida, Tampa, FL	1000 hrs AIAA-2020-1116 **An Intelligent Approach for a Two-robot Team to Perform a Cooperative Task** Y. Sun, A. Barth, O. Ma, University of Cincinnati, Cincinnati, OH	1030 hrs AIAA-2020-1117 **Genetic Fuzzy Systems for Decentralized, Multi-UAV Cargo Handling** C. Bisig, J. Montejo, M. Verbryke, A. Sathyan, O. Ma, University of Cincinnati, Cincinnati, OH	1100 hrs AIAA-2020-1118 **On Performance Improvement of Gain-Scheduled Model Reference Adaptive Control Laws** K. Wilcher, T. Yucelen, University of South Florida, Tampa, FL	1130 hrs AIAA-2020-1119 **Scalability In Model Reference Adaptive Control** J. Jaramillo, T. Yucelen, K. Wilcher, University of South Florida, Tampa, FL		

Wednesday, 8 January 2020						
300-MAT-7/NDA-7/STR-9	**Materials and Designs for Additive Manufacturing I**					**Celebration 13**
Chaired by: B. WARDLE, Massachusettes Institute of Technology and S. WANTHAL, Boeing Research & Technology						
0930 hrs AIAA-2020-1120 **Development of a 3D Printer Capable of Operation in a Vacuum** R. Spicer, W. Wautlet, T. Cote, D. Roberts, Northrop Grumman Corporation, Dulles, VA	1000 hrs AIAA-2020-1121 **Analysis on Pore Generation in Directed Energy Deposition Using a Chamber with a Cooling System** Y. Sugiura, R. Kaike, Y. Kakinuma, Keio University, Yokohama, Japan; M. Kondo, DMG MORI Company, Ltd., Nagoya, Japan	1030 hrs AIAA-2020-1122 **Design and Test of a Small-Scale, Additively-Manufactured, Liquid-Cooled Rocket Nozzle** M. Durkee, C. McCain, A. Quinton, K. Stewart, L. Utley, K. Rouser, Oklahoma State University, Stillwater, OK	1100 hrs AIAA-2020-1123 **Creep-rupture Performance of a Recrystallizing Solution Treatment for Inconel 718 Fabricated by Laser Powder-bed Fusion** D. Newell, A. Palazotto, R. O'Hara, Air Force Institute of Technology, Wright-Patterson AFB, OH	1130 hrs AIAA-2020-1124 **Evolving Material Porosity on an Additive Manufacturing Simulation with the Generalized Method of Cells** L. Silva, F. Yapor Genao, Western Michigan University, Kalamazoo, MI; E. Pineda, NASA Glenn Research Center, Cleveland, OH; P. Gustafson, Western Michigan University, Kalamazoo, MI	1200 hrs AIAA-2020-1125 **Ablation Performances of Additively Manufactured High-Temperature Thermoplastic Polymers** H. Wu, KAI, LLC, Austin, TX; A. Kafi, RMIT University, Melbourne, Australia; C. Yee, O. Atak, J. Langston, University of Texas, Austin, Austin, TX; R. Reber, Arkema, Inc., King of Prussia, PA; et al.	

Wednesday, 8 January 2020						
301-MDO-10	**AFRL EXPEDITE MDAO I and Effectiveness-Based Design**					**Orlando Ballroom N**
Chaired by: C. DAVIES, Lockheed Martin Aeronautics and R. KOLONAY, AFRL/RQVC						
0930 hrs AIAA-2020-1126 **2020 Update on AFRL EXPEDITE Program Progress by Lockheed Martin** C. Davies, J. Montoro, Lockheed Martin Corporation, Palmdale, CA	1000 hrs AIAA-2020-1127 **Tradespace Exploration and Analysis Using Mission Effectiveness in Aircraft Conceptual Design** A. Braafladt, M. Steffens, D. Mavris, Georgia Institute of Technology, Atlanta, GA	1030 hrs AIAA-2020-1128 **Multidisciplinary Design Optimization for Effectiveness-Based Design in the AFRL EXPEDITE Program** M. Levy, K. Choi, Lockheed Martin Corporation, Palmdale, CA	1100 hrs AIAA-2020-1129 **Lockheed Martin Overview of the AFRL EXPEDITE Program: Power and Thermal Management System** F. Torres, Lockheed Martin Corporation, Fort Worth, TX; K. McCarthy, PC Krause and Associates, West Lafayette, IN	1130 hrs AIAA-2020-1130 **Operations Analysis Integration for Effectiveness-Based Design in the AFRL EXPEDITE Program** D. Harper, Lockheed Martin Corporation, Palmdale, CA		

Wednesday, 8 January 2020						
302-MST-7	**Modeling and Simulation of Unmanned Aerial Vehicles**					**Coral Spring II**
Chaired by: S. BHANDARI, Cal Poly Pomona and D. KEATING, The Charles Stark Draper Laboratory, Inc.						
0930 hrs AIAA-2020-1131 **Constructing BADA-like Models of Small Electric UASs from Simulation and Flight Tests** C. Zhang, I. Hwang, Purdue University, West Lafayette, IN	1000 hrs AIAA-2020-1132 **Dynamic Analysis of a UAS Glider Using Advanced Aircraft Analysis and Athena Vortex Lattice** M. Pedari, M. Johnson, J. Lague, M. Yakawu, M. Estrada, D. Bradley, University of Kansas, Lawrence, Lawrence, KS	1030 hrs AIAA-2020-1133 **Modeling and Simulation of Quadcopter Dynamics in Steady Maneuvers** P. McNamee, R. Barrett-Gonzalez, University of Kansas, Lawrence, Lawrence, KS	1100 hrs AIAA-2020-1134 **Space Simulation Overview: Leading Developments towards using Multi-Rotors to Simulate Space Vehicle Dynamics** B. Christensen, G. Gargioni, D. Doyle, K. Schroeder, J. Black, Virginia Polytechnic Institute and State University, Blacksburg, VA			

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303-MST-8	**Modeling and Simulation of Aircraft-Ship Dynamics**					**Bayhill 30**
Chaired by: S. ARMANINI, Imperial College London and J. PETTENGILL, The Boeing Company						
0930 hrs AIAA-2020-1135 **Updated Simulation Results of UAV Carrier Landings** G. Misra, X. Bai, Rutgers University, Piscataway, NJ	1000 hrs AIAA-2020-1136 **Station-Keeping Multirotors Over a Moving Ship** J. Crouse, E. Johnson, Pennsylvania State University, University Park, PA	1030 hrs AIAA-2020-1137 **Simulation of Helicopter Hover and Landing on a Moving Ship Deck using a Dynamic Ground Effect Model** A. Sharma, A. Padthe, P. Friedmann, University of Michigan, Ann Arbor, Ann Arbor, MI	1100 hrs AIAA-2020-1138 **Carrier Landing Simulation using Detailed Aircraft and Landing** M. McDonald, P. Richards, M. Walker, A. Erickson, SDI Engineering, Inc., Kirkland, WA			

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304-MVCE-4	**Mesh Adaptation**					**Bayhill 20**
Chaired by: S. KARMAN, Pointwise, Inc. and J. MASTERS, National Aerospace Solutions						
0930 hrs AIAA-2020-1139 **Exploring Unstructured Mesh Adaptation for Hybrid Reynolds-Averaged Navier–Stokes/Large Eddy Simulation** M. Park, W. Kleb, W. Anderson, S. Wood, A. Balan, NASA Langley Research Center, Hampton, VA; B. Zhou, Technical University of Kaiserslautern, Kaiserslautern, Germany; et al.	1000 hrs AIAA-2020-1140 **Smooth Gradation of Anisotropic Mesh Based on Log-Euclidean Metrics** Z. Xiao, C. Ollivier Gooch, University of British Columbia, Vancouver, Canada	1030 hrs AIAA-2020-1141 **Comparison of Algorithms for High-Order, Metric-Based Mesh Optimization** D. Sanjaya, University of Tennessee, Knoxville, Knoxville, TN; K. Fidkowski, University of Michigan, Ann Arbor, Ann Arbor, MI; S. Murman, NASA Ames Research Center, Moffett Field, CA	1100 hrs AIAA-2020-1142 **Robust implementation of tangential adaptivity** R. Aubry, E. Mestreau, M. Williamschen, S. Dey, W. Szymczak, Naval Research Laboratory, Washington, D.C.	1130 hrs AIAA-2020-1143 **Output-Based Error Estimation and Mesh Adaptation Using Convolutional Neural Networks: Application to a Scalar Advection-Diffusion Problem** G. Chen, K. Fidkowski, University of Michigan, Ann Arbor, Ann Arbor, MI		

Wednesday, 8 January 2020						
305-NDA-8/MDO-11	**Design Under Uncertainty II**					**Celebration 3**
Chaired by: M. RAISROHANI, University of Maine and A. CHAUDHURI, Massachusetts Institute of Technology						
0930 hrs AIAA-2020-1144 **Expected Effectiveness Based Adaptive Multi-Fidelity Modeling for Efficient Design Optimization** A. Beachy, D. Clark, H. Bae, Wright State University, Dayton, OH; E. Forster, Air Force Research Laboratory, Wright-Patterson AFB, OH	1000 hrs AIAA-2020-1145 **Bayesian task embedding for few-shot Bayesian optimization** S. Atkinson, S. Ghosh, N. Chennimalai Kumar, G. Khan, L. Wang, General Electric Company, Niskayuna, NY	1030 hrs AIAA-2020-1146 **Semi-Intrusive Uncertainty Propagation and Adjoint Sensitivity Analysis Using the Stochastic Galerkin Method** K. Boopathy, G. Kennedy, Georgia Institute of Technology, Atlanta, GA	1100 hrs AIAA-2020-1147 **Considering Boundary Condition Uncertainty for Robust Topology Optimization of Flat Plates** A. Vishwanathan, G. Vio, University of Sydney, Sydney, Australia; T. Kipouros, University of Cambridge, Cambridge, United Kingdom			

Wednesday, 8 January 2020						
306-NDA-9/MDO-12/MAT-8	**Physics-Informed Machine Learning: Methods and Applications I**					**Celebration 6**
Chaired by: S. MAHADEVAN, Vanderbilt University and P. ACAR, Virginia Polytechnic Institute and State University						
0930 hrs AIAA-2020-1148 **Quadcopter Control Optimization through Machine Learning** R. Giorgiani do Nascimento, K. Fricke, F. Viana, University of Central Florida, Orlando, FL	1000 hrs AIAA-2020-1149 **Physics-Informed Neural Networks for Bias Compensation in Corrosion-Fatigue** A. Dourado, F. Viana, University of Central Florida, Orlando, FL	1030 hrs AIAA-2020-1150 **High-dimensional Reliability Analysis Using Deep Neural Networks** M. Li, Z. Wang, Michigan Technological University, Houghton, MI	1100 hrs AIAA-2020-1151 **Structural Material Property Tailoring of Dual Phase Titanium Alloy Microstructures Using Deep Neural Networks** N. Somanath, R. Noraas, Pratt & Whitney, East Hartford, CT; M. Giering, O. Oshin, United Technologies Corporation, East Hartford, CT	1130 hrs AIAA-2020-1152 **Machine Learning Reinforced Crystal Plasticity Modeling under Experimental Uncertainty** P. Acar, Virginia Polytechnic Institute and State University, Blacksburg, VA		

Wednesday, 8 January 2020						
307-PC-13	**High Pressure Combustion**					**Bayhill 25**
Chaired by: J. OEFELEIN, Georgia Institute of Technology and B. CHEHROUDI, Advanced Technology Consultants						
0930 hrs AIAA-2020-1153 **Turbulent high-pressure reaction-rate modeling using the Double-conditioned Conditional Source-term Estimation method** W. Bushe, University of British Columbia, Vancouver, Canada; C. Devaud, University of Waterloo, Waterloo, Canada; J. Bellan, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA	1000 hrs AIAA-2020-1154 **A thermodynamic look at injection in aerospace propulsion systems** D. Banuti, University of New Mexico, Albuquerque, Albuquerque, NM	1030 hrs AIAA-2020-1155 **Inter-species molecular attraction effect in the development of a two-species mixing layer** D. Banuti, J. Bellan, California Institute of Technology, Pasadena, CA	1100 hrs AIAA-2020-1156 **Turbulent mixing in supercritical jets: effect of compressibility factor and inflow condition** N. Sharan, J. Bellan, California Institute of Technology, Pasadena, CA	1130 hrs AIAA-2020-1157 **Accelerating Numerical Simulations of Supercritical Fluid Flows using Deep Neural Networks** P. Milan, Georgia Institute of Technology, Atlanta, GA; X. Wang, Florida Institute of Technology, Melbourne, FL; J. Hickey, University of Waterloo, Waterloo, Canada; Y. Li, V. Yang, Georgia Institute of Technology, Atlanta, GA		

Wednesday, 8 January 2020

308-PC-14	Combustion Dynamics II					Bayhill 26
Chaired by: J. O'CONNOR, Pennsylvania State University and B. EMERSON						
0930 hrs AIAA-2020-1158 **The Flame Surface Speed Budget for Turbulent Premixed Flame Stabilization Studies** P. Palies, CFD Research Corporation (CFDRC), Huntsville, AL	1000 hrs AIAA-2020-1159 **Sensitivity Studies of Premixed Flame Response to Transverse, High Frequency Disturbances** V. Acharya, T. Lieuwen, Georgia Institute of Technology, Atlanta, GA	1030 hrs AIAA-2020-1160 **Methodologies to Produce Three-Dimensional Insight from Planar Measurements of Swirling, Reacting Jets** S. Schmidheiser, H. Ek, T. Lieuwen, Georgia Institute of Technology, Atlanta, GA; C. Fugger, P. Hsu, N. Jiang, Spectral Energies, LLC, Dayton, OH; et al.	1100 hrs AIAA-2020-1161 **High-performance data analytics of hybrid rocket fuel combustion data using different machine learning approaches** C. Debus, A. Ruettgers, German Aerospace Center (DLR), Cologne, Germany; A. Petrarolo, M. Kobald, German Aerospace Center (DLR), Hardthausen, Germany; M. Siggel, German Aerospace Center (DLR), Cologne, Germany	1130 hrs AIAA-2020-1162 **Numerical Investigation of Combustion Instabilities in a Rocket Combustion Chamber with Supercritical Injection Using a Hybrid RANS/LES Method** A. Lechtenberg, P. Gerlinger, German Aerospace Center (DLR), Stuttgart, Germany	1200 hrs AIAA-2020-1163 **Grid Characteristics Study of a Bluff-Body Stabilized Turbulent Premixed Flame** Z. Jozefik, ERC, Inc., Edwards AFB, CA; M. Harvazinski, V. Sankaran, Air Force Research Laboratory, Edwards AFB, CA	

Wednesday, 8 January 2020

309-PDL-8	Plasma Actuators I					Bayhill 24
Chaired by: S. BANE, Purdue University, School of Aeronautics and Astronautics						
0930 hrs AIAA-2020-1164 **Experimental Characterization of Flow Induced by a Nanosecond Surface Discharge** L. Rajendran, B. Singh, R. Jagannath, G. Schmidt, P. Vlachos, S. Bane, Purdue University, West Lafayette, IN	1000 hrs AIAA-2020-1165 **Modeling DBD (Dielectric Barrier Discharge) generated ozone distribution for effective decontamination of spacecraft components** B. Choudhury, S. Portugal, J. Johnson, S. Roy, University of Florida, Gainesville, Gainesville, FL	1030 hrs AIAA-2020-1166 **Effects of Numerical Plasma Modeling on Performance Characterization of Plasma Actuator** K. Nakai, H. Nishida, Tokyo University of Agriculture and Technology, Tokyo, Japan	1100 hrs AIAA-2020-1167 **Magnetically Driven Arc as a Vortex Generator for the Boundary Layer Control Applications** I. Moralev, V. Bityurin, A. Bocharov, P. Kazansky, Joint Institute for High Temperatures RAS, Moscow, Russia; A. Kotvitskii, Bauman Moscow State Technical University, Moscow, Russia; P. Semenev, Central Institute of Aviation Motors, Moscow, Russia	1130 hrs AIAA-2020-1168 **Broadband Stochastic Forcing of a Boundary Layer by sDBD Plasma Actuator** I. Moralev, Russian Academy of Sciences, Moscow, Russia; I. Selivonin, I. Popov, Moscow Power Engineering Institute (MPEI), Moscow, Russia; M. Ustinov, TsAGI, Zhukovskii, Russia		

Wednesday, 8 January 2020

310-PGC-6/PC-15	Pressure Gain Combustion: Combustor Testing, Operability, and Performance II					Manatee Spring II
Chaired by: G. PANIAGUA, Purdue University and M. GAMBA, University of Michigan						
0930 hrs AIAA-2020-1169 **Recent Experimental and Numerical Study on Disc-Type RDEs** A. Hayashi, Aoyama Gakuin University, Tokyo, Japan	1000 hrs AIAA-2020-1170 **Experimental Analysis of Ethylene/Hydrogen Fuel Blend Detonations** A. Knisely, J. Hoke, Innovative Scientific Solutions, Inc., Dayton, OH; S. Schumaker, Air Force Research Laboratory, Wright-Patterson AFB, OH	1030 hrs AIAA-2020-1171 **Mode Classification of Combustion and Propulsive Performance of Reflective Shuttling Detonation Combustor** M. Yamaguchi, K. Matsuoka, A. Kawasaki, J. Kasahara, Nagoya University, Nagoya, Japan; H. Watanabe, A. Matsuo, Keio University, Yokohama, Japan	1100 hrs AIAA-2020-1172 **Wave Modes in an Ethylene-Air Rotating Detonation Combustor from Fuel Lean to Rich Conditions** X. Huang, P. Chang, J. Li, C. Teo, B. Khoo, National University of Singapore, Singapore, Singapore	1130 hrs AIAA-2020-1173 **Demonstrated Low Loss and Low Equivalence Ratio Operation of a Rotating Detonation Engine for Power Generation** J. Stout, A. Baratta, Aerojet Rocketdyne, Canoga Park, CA	1200 hrs AIAA-2020-1174 **Large-Eddy Simulation of Rotating Detonation with a Non-premixed CH_4/O_2 Injection** S. Matsuyama, K. Iwata, Y. Nunome, H. Tanno, Japan Aerospace Exploration Agency (JAXA), Chofu, Japan; T. Mizukaki, Tokai University, Hiratsuka, Japan; M. Kojima, Japan Aerospace Exploration Agency (JAXA), Chofu, Japan; et al.	

Wednesday, 8 January 2020						
311-PGC-7	**Pressure Gain Combustion: Measurement and Diagnostic Techniques**					**Manatee Spring I**
Chaired by: D. FERGUSON, National Energy Technology Laboratory and J. HOKE, Innovative Scientific Solutions Incorporated						
0930 hrs AIAA-2020-1175 **Time-resolved Measurements of Detonation Decoupling and Amplification** H. Chin, University of Central Florida, Orlando, FL; D. Cuppoletti, T. Ombrello, Air Force Research Laboratory, Wright-Patterson AFB, OH; K. Rein, Spectral Energies, LLC, Beavercreek, OH; K. Ahmed, University of Central Florida, Orlando, FL	1000 hrs AIAA-2020-1176 **Flowfield Velocity Measurements of a Rotating Detonation Engine** I. Dunn, J. Sosa, University of Central Florida, Orlando, FL; M. Salvadori, Georgia Institute of Technology, Atlanta, GA; K. Ahmed, University of Central Florida, Orlando, FL; S. Menon, Georgia Institute of Technology, Atlanta, GA	1030 hrs AIAA-2020-1177 **Quantitative Ion Probe Measurements for Application in a Rotating Detonation Engine** C. Bedick, D. Ferguson, National Energy Technology Laboratory, Morgantown, WV	1100 hrs AIAA-2020-1178 **High speed imaging of injection backflow and recovery in a Turbine-integrated High-pressure Optical RDE (THOR)** V. Athmanathan, Z. Ayers, J. Fisher, J. Braun, V. Andreoli, D. Cuadrado, Purdue University, West Lafayette, IN; et al.	1130 hrs AIAA-2020-1179 **Validation of Cross-Correlation Detonation Wave Mode Identification Through High-Speed Image Analysis** K. Johnson, D. Ferguson, National Energy Technology Laboratory, Morgantown, WV; A. Nix, West Virginia University, Morgantown, WV	1200 hrs AIAA-2020-1180 **Rapid Minimum Tube Diameter Measurement and Comparison with Detonation Cell Size** A. Knisely, A. Naples, K. Brady, J. Hoke, Innovative Scientific Solutions, Inc., Dayton, OH; S. Schumaker, Air Force Research Laboratory, Wright-Patterson AFB, OH	

Wednesday, 8 January 2020						
312-SCS-5	**Spacecraft Booms and Trusses and Testing of Lightweight Spacecraft Structures I**					**Celebration 12**
Chaired by: J. FOOTDALE, Ball Aerospace & Technologies Corporation and S. WILSON, NASA-Johnson Space Center						
0930 hrs AIAA-2020-1181 **Deployment and Retraction Demonstration of Corrugated Closed-Section CFRP Booms** H. Furuya, H. Okada, Tokyo Institute of Technology, Yokohama, Japan	1000 hrs AIAA-2020-1182 **Concept Design of Occulter Using Modular Self-Deployable Membrane Truss** S. Shitara, S. Kataoka, A. Kawashita, Y. Miyazaki, Nihon University, Funabashi, Japan	1030 hrs AIAA-2020-1183 **Impact of Storage Time and Operational Temperature on Deployable Composite Booms** B. Adamcik, J. Firth, M. Pankow, North Carolina State University, Raleigh, NC; J. Fernandez, NASA Langley Research Center, Hampton, VA	1100 hrs AIAA-2020-1184 **An energy optimisation approach to modelling tape spring behaviour** J. Shore, A. Viquerat, University of Surrey, Guildford, United Kingdom; G. Richardson, Surrey Satellite Technology, Ltd., Guildford, United Kingdom; G. Aglietti, University of Surrey, Guildford, United Kingdom			

Wednesday, 8 January 2020						
313-SD-9	**Aircraft Load Alleviation**					**Celebration 15**
Chaired by: P. TAYLOR, Gulfstream Aerospace Corporation and A. SCOTTI, Pilatus Aircraft Ltd						
0930 hrs AIAA-2020-1185 **Impact of Control-Surface Flexibility on the Dynamic Response of Flexible Aircraft** D. Sanghi, C. Riso, C. Cesnik, University of Michigan, Ann Arbor, Ann Arbor, MI; F. Vetrano, Airbus, Toulouse, France	1000 hrs AIAA-2020-1186 **Control Allocation for Maneuver and Gust Load Alleviation of Flexible Aircraft** J. Hansen, M. Duan, I. Kolmanovsky, C. Cesnik, University of Michigan, Ann Arbor, Ann Arbor, MI	1030 hrs AIAA-2020-1187 **Realistic Turbulence Effects in Low Altitude Dynamics of Very Flexible Aircraft** A. Del Carre, G. Deskos, R. Palacios, Imperial College London, London, United Kingdom	1100 hrs AIAA-2020-1188 **Analysis of Control Surface Configurations for Aerodynamic Load Alleviation** C. Schlemmer, L. Dehmlow, F. José Silvestre, Technical University of Berlin, Berlin, Germany	1130 hrs AIAA-2020-1189 **Buffet Mitigation Control System for High Performance Aircraft** S. Malik, Abu Dhabi Polytechnic, Al Ain, United Arab Emirates; S. Ricci, Technical University of Milan, Milan, Italy; D. Monti, Leonardo, Milan, Italy		

Wednesday, 8 January 2020						
314-SD-10	**Flight Dynamics of Highly Flexible Aircraft**					**Celebration 1**
Chaired by: R. PALACIOS, Imperial College London and J. COOPER, University of Bristol						
0930 hrs AIAA-2020-1190 **Projection-based Model Order Reduction for Flight Dynamics and Model Predictive Control** A. McClellan, J. Lorenzetti, M. Pavone, C. Farhat, Stanford University, Stanford, CA	1000 hrs AIAA-2020-1191 **Parametric Roll Maneuverability Analysis of a High-Aspect-Ratio-Wing Civil Transport Aircraft** C. Riso, D. Sanghi, C. Cesnik, University of Michigan, Ann Arbor, Ann Arbor, MI; F. Vetrano, P. Teufel, Airbus, Toulouse, France	1030 hrs AIAA-2020-1192 **Modal-Based Nonlinear Estimation and Control for Highly Flexible Aeroelastic Systems** M. Artola, N. Goizueta, A. Wynn, R. Palacios, Imperial College London, London, United Kingdom				

Wednesday, 8 January 2020						
315-SEN-3	**Identification and Machine Learning**					**Celebration 8**
Chaired by: D. FAULK, Lockheed Martin Aeronautics						
0930 hrs AIAA-2020-1193 **Exploring Cognitive States: Temporal Methods for Detecting and Characterizing Physiological Fingerprints** N. Napoli, University of Florida, Gainesville, Gainesville, FL; S. Adams, University of Virginia, Charlottesville, Charlottesville, VA; A. Harrivel, C. Stephens, K. Kennedy, NASA Langley Research Center, Hampton, VA; M. Paliwal, University of Florida, Gainesville, Gainesville, FL; et al.	1000 hrs AIAA-2020-1194 **Partial Label Learning of RF Emitters with LSTMs** R. Moseley, Lockheed Martin Corporation, Fort Worth, TX	1030 hrs AIAA-2020-1195 **Spacecraft Identification Leveraging Unsupervised Learning Techniques for Formation and Swarm Missions** J. Davis, H. Pernicka, Missouri University of Science and Technology, Rolla, MO	1100 hrs AIAA-2020-1196 **Classification, Analysis, and Prediction of the Daily Operations of Airports Using Machine Learning** E. Mangortey, T. Puranik, O. Pinon-Fischer, D. Mavris, Georgia Institute of Technology, Atlanta, GA	1130 hrs AIAA-2020-1197 **Estimating the Real-time Spread of Wildfires with Vision-Equipped UAVs and Temperature Sensors via Evidential Reasoning** A. Soderlund, M. Kumar, R. Aggarwal, Ohio State University, Columbus, OH	1200 hrs AIAA-2020-1198 **Improved Anomaly Detection in Experimental Wind Tunnel Data using PCA** A. Defreitas, W. Alexander, W. Devenport, S. Merkes, S. Leman, E. Smith, Virginia Polytechnic Institute and State University, Blacksburg, VA; et al.	

Wednesday, 8 January 2020						
316-SFM-13	**Attitude Dynamics, Determination and Control I**					**Bayhill 27**
Chaired by: R. ZANETTI, University of Texas at Austin						
0930 hrs AIAA-2020-1199 **Study and Development of a Safe Sun Pointing Mode for the Proba-3 Mission** P. Woo, L. Sobiesiak, M. Langelier, J. Hamel, NGC Aerospace, Ltd., Sherbrooke, Canada; L. Strippoli, M. Canetri, GMV, Madrid, Spain; et al.	1000 hrs AIAA-2020-1200 **Optimal Power Management Considering Attitude Control and Battery Deterioration Control for Spacecraft with VSCMG/IPACS** H. Yoshihara, M. Takahashi, Keio University, Yokohama, Japan	1030 hrs AIAA-2020-1201 **Design Tradeoffs Using Second Order Repetitive Control to Reduce Sensitivity to Disturbance Period** A. Ismail, R. Longman, Columbia University, New York, NY	1100 hrs AIAA-2020-1202 **Optimization of Magnetic Attitude Maneuvers** M. Desouky, Michigan Technological University, Houghton, MI; O. Abdelkhalik, Iowa State University, Ames, IA; L. Gauchia, Michigan Technological University, Houghton, MI	1130 hrs AIAA-2020-1203 **A Real-Time Approach to Minimum-Energy Reorientation of an Asymmetric Rigid Body Spacecraft** S. McDonald, T. Grizzel, Z. Wang, University of Tennessee, Knoxville, Knoxville, TN		

Wednesday, 8 January 2020						
317-SFM-14	**Asteroid and Non-Earth Orbiting Missions II**					**Bayhill 29**
Chaired by: R. WILSON, Jet Propulsion Laboratory						
0930 hrs AIAA-2020-1204 **Centralized Autonomous Relative Navigation of Multiple Spacecraft Around Small Bodies** S. Silvestrini, A. Capannolo, M. Piccinin, M. Lavagna, Technical University of Milan, Milan, Italy; J. Gil Fernandez, ESA - ESTEC, Noordwijk, The Netherlands	1000 hrs AIAA-2020-1205 **A CubeSat-based Robotic Asteroid Sampling Mission** M. Bazzocchi, H. Hakima, University of Toronto, Toronto, Canada	1030 hrs AIAA-2020-1206 **MAVEN Orbital Trajectory Analysis: Design and Implementation of Lander Relay Support** R. Beswick, S. Demcak, B. Young, S. McCandless, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA; J. Carpenter, R. Burns, NASA Goddard Space Flight Center, Greenbelt, MD; et al.	1100 hrs AIAA-2020-1207 **Solar Sailing Fundamentals with an Exploration of Trajectory Control to Lunar Halo Orbit** L. Vance, R. Nallapu, J. Thangavelautham, University of Arizona, Tucson, Tucson, AZ	1130 hrs AIAA-2020-1208 **Hayabusa2 spacecraft dynamics and operational design of final descent and touchdown in sampling mission** K. Yoshikawa, S. Kikuchi, H. Sawada, G. Ono, Y. Mimasu, N. Ogawa, Japan Aerospace Exploration Agency (JAXA), Sagamihara, Japan; et al.	1200 hrs AIAA-2020-1209 **JUICE: Europa Planetary Protection Analysis** A. Boutonnet, W. Martens, ESA, Darmstadt, Germany	

Wednesday, 8 January 2020						
318-STR-10	**Characterization and Failure Prediction of Composite Structures III**					**Celebration 5**
Chaired by: L. FOSTER, Pratt & Whitney and S. STAPLETON, Mechanical Engineering						
0930 hrs AIAA-2020-1210 **Coupled Simulation of Hydrothermal Aging Effects on Residual Strength of Open Hole Composite Laminates** J. McQuien, K. Hoos, University of Texas, Arlington, Fort Worth, TX; K. Pochiraju, Stevens Institute of Technology, Hoboken, NJ; E. Iarve, University of Texas, Arlington, Fort Worth, TX; D. Mollenhauer, Air Force Research Laboratory, Wright-Patterson AFB, OH	1000 hrs AIAA-2020-1211 **Development of LS-DYNA MAT261 Material Parameters for Tri-axially Braided Composite Materials** D. Manan, J. Kim, University of Connecticut, Storrs, Storrs, CT; G. Gopinath, G. Askel, P. Finnigan, L. Foster, Pratt & Whitney, East Hartford, CT; et al.	1030 hrs AIAA-2020-1212 **Out-of-Plane Shear Properties of IM7/8552 Carbon/Epoxy by V-notched Shear Testing** R. Haluza, K. Koudela, C. Bakis, Pennsylvania State University, University Park, PA; D. Adams, M. Perl, University of Utah, Salt Lake City, Salt Lake City, UT; M. Pereira, NASA Glenn Research Center, Cleveland, OH	1100 hrs AIAA-2020-1213 **A Peridynamic Computational Investigation of Carbon Nanotube Yarn Reinforced Composites** F. Baber, I. Guven, Virginia Commonwealth University, Richmond, VA	1130 hrs AIAA-2020-1214 **Damage Tolerance Approach for Composite Space Structures with Curved Bends** P. Babuska, V. Goyal, The Aerospace Corporation, El Segundo, CA; I. Maqueda, J. Gutierrez, T. Carpenter, SpaceX, Hawthorne, CA	1200 hrs AIAA-2020-1215 **Crippling Failure Prediction in Composites Using Machine Learning** A. Selvarathinam, T. Warriner, C. Rouseau, Lockheed Martin Corporation, Fort Worth, TX	

Wednesday, 8 January 2020						
319-SUR-3	**Survivability - General Considerations**					**Celebration 14**
Chaired by: W. SCHONBERG, Missouri University of Science and Technology and S. BROUSSARD, The Boeing Company						
0930 hrs AIAA-2020-1216 **Tank Size Effects on Hyrdrodynamic Cavity Formation and Collapse** A. Goss, 704th Test Group, Wright-Patterson AFB, OH; T. Staley, Air Force Life Cycle Management Center, Wright-Patterson AFB, OH; L. Truett, Air Force Institute of Technology, Wright-Patterson AFB, OH; B. Barlow, 704th Test Group, Wright-Patterson AFB, OH; M. McBride, Air Force Institute of Technology, Wright-Patterson AFB, OH	1000 hrs AIAA-2020-1217 **Survivability and Damage Modeling of Advanced Materials** D. Spear, A. Palazotto, R. Kemnitz, Air Force Institute of Technology, Wright-Patterson AFB, OH	1030 hrs AIAA-2020-1218 **Ballistic Limit Shot Dependency Testing in Composite Materials** M. Keane, A. Lingenfelter, M. Walker, R. Hill, Air Force Institute of Technology, Wright-Patterson AFB, OH	1100 hrs AIAA-2020-1219 **Static and Dynamic Modeling of MIL-STD-1760 Umbilical Separation Using Empirically Determined Friction Coefficients** A. Nesmith, J. DeWitt, A. Lingenfelter, Air Force Institute of Technology, Wright-Patterson AFB, OH			

Wednesday, 8 January 2020						
320-TES-1	**Thermal and Fluid Behavior in Power Systems**					**Bayhill 22**
Chaired by: K. ANDERSON, CAL POLY POMONA and T. ABDEL-SALAM, East Carolina University						
0930 hrs AIAA-2020-1220 **Effect of fuel change from petroleum kerosene to HEFA alternative jet fuel on the emission of an RQL gas-turbine combustor under high-pressure and high-temperature conditions** K. Okai, H. Fujiwara, M. Makida, K. Shimodaira, Japan Aerospace Exploration Agency (JAXA), Chofu, Japan	1000 hrs AIAA-2020-1221 **Air Flow Patterns and Thermal Comfort in a Room with Diverse Heating Systems** E. Khalil, Cairo University, Cairo, Egypt; M. Sobhi, Madina Higher Institute for Engineering and Technology, Cairo, Egypt	1030 hrs AIAA-2020-1222 **Computer Simulation of Air Distribution and Thermal Comfort in Energy Efficient Buildings** E. Khalil, Cairo University, Cairo, Egypt	1100 hrs AIAA-2020-1223 **Thermal Comfort in Commercial Aircrafts Cabins: A Review** E. Khalil, Cairo University, Cairo, Egypt	1130 hrs AIAA-2020-1224 **Numerical Investigation of Smoke Behaviour and Management in Auditorium Hall** E. Khalil, Cairo University, Cairo, Egypt	1200 hrs AIAA-2020-1225 **Experimental Investigation of a Two-Stage Indirect/Direct Evaporative Cooling System under Different Climatic Conditions** A. Mohamed, E. Khalil, G. ElHarriri, Cairo University, Cairo, Egypt	

Wednesday, 8 January 2020						
321-TP-7	**Non-Equilibrium Flows I**					**Columbia 37**
Chaired by: X. WANG, The University of Alabama and J. BATSON, Lockheed Martin						
0930 hrs AIAA-2020-1226 **Reduced-Order Modeling for Non-equilibrium Air Flows** A. Munafò, S. Venturi, M. Sharma Priyadarshini, M. Panesi, University of Illinois, Urbana-Champaign, Urbana, IL	1000 hrs AIAA-2020-1227 **Ab-Initio Based Reduced Order Model for Hypersonic Flow Simulations** M. Grover, P. Valentini, E. Josyula, Air Force Research Laboratory, Wright-Patterson AFB, OH; R. Chaudhry, University of Michigan, Ann Arbor, Ann Arbor, MI	1030 hrs AIAA-2020-1228 **Assessment of Thermochemical Kinetics Modeling on Hypersonic Flow Over a Double Cone** M. Holloway, I. Boyd, University of Michigan, Ann Arbor, Ann Arbor, MI	1100 hrs AIAA-2020-1229 **Detailed comparison of diffusive transport phenomena between CFD and DSMC** M. Kroells, C. Amato, E. Torres, T. Schwartzentruber, G. Candler, University of Minnesota, Twin Cities, Minneapolis, MN			

Wednesday, 8 January 2020						
322-TP-8	**Theoretical, Experimental and Computational Heat Transfer II**					**Silver Spring I**
Chaired by: E. SHORT, Raytheon and P. YEE, The Aerospace Corporation						
0930 hrs AIAA-2020-1230 **PIV and Rotational Raman-Based Temperature Measurements for CFD Validation of a Perforated Plate Cooling Flow: Part I** M. Wernet, N. Georgiadis, NASA Glenn Research Center, Cleveland, OH; R. Locke, Vantage Partners, LLC, Cleveland, OH; D. Thurman, Army Research Laboratory, Cleveland, OH; P. Poinsatte, NASA Glenn Research Center, Cleveland, OH	1000 hrs AIAA-2020-1231 **Developing an Improved 1-D Thermoflow Approach to Analyze Turbine Vane Temperature Distribution** R. Jalali, M. Darbandi, Sharif University of Technology, Tehran, Iran; G. Schneider, University of Waterloo, Waterloo, Canada	1030 hrs AIAA-2020-1232 **Thermal Radiative Boundary Design of Enclosure Filled with Micro-and Nano-sized Particles** B. Moghadassian, M. Jafari, P. Hafezisefat, Iowa State University, Ames, IA; M. Hassanalian, New Mexico Institute of Mining and Technology, Socorro, NM	1100 hrs AIAA-2020-1233 **Numerical solution of hypersonic flows via artificial neural networks** E. Ozbenli, P. Vedula, University of Oklahoma, Norman, Norman, OK; K. Vogiatzis, Next Frontier, LLC, Tucson, AZ; E. Josyula, Air Force Research Laboratory, Wright-Patterson AFB, OH			

Wednesday, 8 January 2020

323-UAS-5	UAS Guidance, Navigation, and Control II					Celebration 16
Chaired by: R. STANSBURY, Embry-Riddle Aeronautical University						
0930 hrs AIAA-2020-1234 **Closed-Loop Q-Learning Control of a Small Unmanned Aircraft** R. Clarke, L. Fletcher, University of Bristol, Bristol, United Kingdom; C. Greatwood, Perceptual Robotics, Bristol, United Kingdom; A. Waldock, Dyson Limited, Malmesbury, United Kingdom; T. Richardson, University of Bristol, Bristol, United Kingdom	1000 hrs AIAA-2020-1235 **Aircraft Speed/Altitude Control Using a Sigma-Pi Neural Network** S. Kim, University of Central Florida, Orlando, FL; K. Horspool, Lockheed Martin Corporation, Orlando, FL	1030 hrs AIAA-2020-1236 **Dubins Path Guidance for Fixed-Wing UAS Remote Sensing Applications** A. Blevins, S. Keshmiri, D. Shukla, G. Godfrey, University of Kansas, Lawrence, Lawrence, KS	1100 hrs AIAA-2020-1237 **A Robust Controller for Transition between Hover and Forward Flight for Hybrid Fixed Wing - Multicopters** E. Orhan, K. Subbarao, University of Texas, Arlington, Arlington, TX	1130 hrs AIAA-2020-1238 **Quadrotor Drone System Identification via Model-Based Design and In-Flight Sine Wave Injections** D. Kaputa, Rochester Institute of Technology, Rochester, NY; K. Owens, Moog, Inc., East Aurora, NY	1200 hrs AIAA-2020-1239 **Simulation of a Machine Learning Based Controller for a Fixed-Wing UAV with Distributed Sensors** A. Guerra-Langan, S. Araujo-Estrada, A. Richards, S. Windsor, University of Bristol, Bristol, United Kingdom	

Wednesday, 8 January 2020

324-WE-6	Wind Energy Innovations					Plaza Ballroom D
Chaired by: F. AVALLONE, Delft University of Technology and S. KANNER, Principle Power Inc						
0930 hrs AIAA-2020-1240 **How does yawed inflow affect the performance of ducted wind turbines?** V. Dighe, Delft University of Technology, Delft, The Netherlands; D. Suri, Manipal Institute of Technology, Manipal, India; F. Avallone, G. van Bussel, Delft University of Technology, Delft, The Netherlands	1000 hrs AIAA-2020-1241 **Performance of AeroMINEs for Distributed Wind Energy** S. Pol, Texas Tech University, Lubbock, TX; B. Houchens, D. Marian, Sandia National Laboratories, Livermore, CA; C. Westergaard, Westergaard Solutions, Inc., Houston, TX	1030 hrs AIAA-2020-1242 **Performance and Proximity Investigations on Small Scale Lensed Turbines** N. Novotny, S. Gunasekaran, University of Dayton, Dayton, OH	1100 hrs AIAA-2020-1243 **Simulation of the Transition Phase for an Optimally-Controlled Tethered VTOL Rigid Aircraft for AirborneWind Energy Generation** M. Rushdi, Kyushu University, Fukuoka, Japan; A. Hussein, Virginia Polytechnic Institute and State University, Blacksburg, VA; T. Dief, S. Yoshida, Kyushu University, Fukuoka, Japan; R. Schmehl, Delft University of Technology, Delft, The Netherlands	1130 hrs AIAA-2020-1244 **Hardwar-in-the-Loop (HIL) and Experimental Findings for the 7 kW Pumping Kite Power System** T. Dief, M. Rushdi, A. Halawa, S. Yoshida, Kyushu University, Fukuoka, Japan		

Wednesday, 8 January 2020

325-HUB-5 1000 - 1030 hrs	Interview with Mary Lynne Dittmar	the HUB
Dr. Dittmar is the president and CEO of the Coalition for Deep Space Exploration, a group of space industry businesses and nonprofits that advocate for long-term, sustainable human exploration of deep space. A 25-year veteran of the space industry, Dittmar is a member of the National Space Council Users' Advisory Group and previously managed Boeing flight operations on the ISS.		

Wednesday, 8 January 2020

326-HUB-6 1030 - 1130 hrs	AIAA DEFENSE Forum Preview: "Compete, Deter and Win: Innovation at the Speed of Relevance"	the HUB
The 2020 AIAA DEFENSE Forum, to be held 5-7 May in Laurel, MD, will bring together government, military, industry, and academia to discuss the strategic, programmatic, and technical topics and policy issues in aerospace and defense. Come learn about the planned technical and plenary discussions from members of the Executive Steering and Technical Program Committees, and find out how you can participate!		

Wednesday, 8 January 2020

327-HUB-7 1130 - 1230 hrs	ASCEND Town Hall	the HUB
Please join us for a community discussion about AIAA's new space conference, ASCEND (Accelerating Space Commerce, Exploration, and New Discovery), led by Executive Producer Rob Meyerson. Rob and other project leaders will discuss the vision and purpose of ASCEND, collect community comments and inputs, and answer questions. The inaugural ASCEND will be held 16-18 November 2020 in Las Vegas, Nevada, and the Call for Content is open now through 17 March 2020.		

Wednesday, 8 January 2020

328-LUNCH-3 1230 - 1400 hrs	Networking Boxed Luncheon	Exposition Hall

Wednesday, 8 January 2020		
329-HUB-8 **1300 - 1400 hrs**	**Materials Start-Up Panel**	**the HUB**
Start-up companies play a unique "enabler" role to vet novel research ideas and results in commercial applications and markets, but are a currently-untapped resource for the AIAA community. In this panel session, representatives from start-up companies focused on innovative materials science will present their products, operations, and vision for future directions, to enlighten and encourage the audience about potential future collaboration.		

Wednesday, 8 January 2020		
330-RLA-3 **1300 - 1400 hrs**	**Enabling the Future of Aviation**	**Windermere Ballroom**
This session will discuss NASA's vision for aeronautics and the leadership/strategy for aeronautics in an R&D organization. Organized by: International Forum for Aviation Research (IFAR). This session is a part of their Virtual Exchange (IVX) series. **Jay Dryer** **Deputy Associate Administrator for Programs** **NASA Aeronautics Research Mission Directorate**		

Wednesday, 8 January 2020		
331-HUB-9 **1400 - 1430 hrs**	**Aircraft Design/RDSwin Presentation with Dan Raymer**	**the HUB**
Stage presentation of RDSwin software with book signing to follow in booth.		

Wednesday, 8 January 2020						
332-AA-6	**Jet Noise V**					**Peacock Spring**
Chaired by: R. POWERS, Naval Air Warfare Center and A. PILON, Lockheed Martin Aeronautics						
1430 hrs AIAA-2020-1245 **Sources of Sound and its Radiation from Twin Turbulent Jets** N. Muthichur, S. Hemchandra, H. Tummalapalli, A. Samanta, Indian Institute of Science, Bengaluru, India	1500 hrs AIAA-2020-1246 **Wavenumber Frequency Spectra of the Density Near-field of a Non-uniformly Heated Jet** K. Daniel, D. Mayo, T. Lowe, W. Ng, Virginia Polytechnic Institute and State University, Blacksburg, VA	1530 hrs AIAA-2020-1247 **Noise and Flow Characterization of Supersonic Jets Emanating from a Circular and Faceted Nozzles** M. Saleem, O. Lopez Rodriguez, E. Gutmark, University of Cincinnati, Cincinnati, OH; J. Liu, Y. Khine, Naval Research Laboratory, Washington, D.C.	1600 hrs AIAA-2020-1248 **Global stability analysis of supersonic jets** M. Karp, T. Flint, P. Hack, Stanford University, Stanford, CA	1630 hrs AIAA-2020-1249 **Nozzle Length and Aft Deck Effects on the Aeroacoustics of Dual Stream Supersonic Jets** S. Hromisin, D. McLaughlin, P. Morris, Pennsylvania State University, University Park, PA		

Wednesday, 8 January 2020						
333-AA-7	**Turbomachinery Noise**					**Silver Spring I**
Chaired by: J. MENDOZA, United Technologies Research Center and J. WINKLER, United Technologies Research Center						
1430 hrs AIAA-2020-1250 **Numerical Aerodynamics and Acoustics Performance Study of Turbocharger Compressor Equipped with Active Casing Treatment** M. Messele, A. Engeda, Michigan State University, East Lansing, MI	1500 hrs AIAA-2020-1251 **Toward Prediction of Tornado Noise within the Turbulent Atmosphere using Theory, Wind Tunnel Measurements, and Field-Tests** T. Zhang, S. Miller, University of Florida, Gainesville, Gainesville, FL	1530 hrs AIAA-2020-1252 **Propeller Noise in Confined Anechoic and Open Environments** J. Whelchel, W. Alexander, N. Intaratep, Virginia Polytechnic Institute and State University, Blacksburg, VA	1600 hrs AIAA-2020-1253 **Characterization of Hybrid Wind Tunnel Environments Using Laser-Induced Acoustic Sources** M. Szoke , Virginia Polytechnic Institute and State University, Blacksburg, VA; C. Bahr, F. Hutcheson, NASA Langley Research Center, Hampton, VA; W. Devenport, Virginia Polytechnic Institute and State University, Blacksburg, VA	1630 hrs AIAA-2020-1254 **A preliminary study of dynamic stall noise** Y. Mayer, B. Zang, M. Azarpeyvand, University of Bristol, Bristol, United Kingdom		

Wednesday, 8 January 2020

334-ACD-11/AFM-11 — **Formation Flying II** — **Orlando Ballroom L**

Chaired by: D. CARTER, Air Force Research Laboratory

1430 hrs
Efficient Formation Flight: Next Steps Panel Discussion
Moderator: Donald Erbschloe, Erbschloe Technical Consulting

Key Managers, leaders and technologists will discuss the feasibility of efficient formation flight n future aviation, the challenges and obstacles to adoption, and potential ways forward.

1530 hrs
AIAA-2020-1255
Maneuvers during Automatic Formation Flight of Transport Aircraft for Fuel Savings
A. Kaden, R. Luckner, Technical University of Berlin, Berlin, Germany

1600 hrs
AIAA-2020-1256
Optimal Timing and Arrangement for Two-Aircraft Formations on North Atlantic under Consideration of Wind
T. Marks, German Aerospace Center (DLR), Hamburg, Germany; M. Swaid, Technical University of Hamburg, Hamburg, Germany

1630 hrs
AIAA-2020-1257
Advances in Cooperative Trajectories for Commercial Applications
T. Flanzer, S. Bieniawski, The Boeing Company, Everett, WA; J. Brown, Self, Woodinville, WA

1700 hrs
Oral Presentation
Proximity Flight Analysis Using Distributed Circulation
R. Hartfield, Auburn University, Auburn, AL

Wednesday, 8 January 2020

335-ACD-12 — **Conceptual Aircraft Design Working Group (CADWG21)** — **Plaza Ballroom E**
1430 - 1730 hrs

The Trials and Tribulations of Conceptual Rotorcraft Design

Moderators: Timothy Takahashi, Arizona State University and Ruben Perez, Royal Military College of Canada

Panelists:

Mark R. Alber
Sikorsky Lockheed Martin

Jeff Sinsay
Aeronautic Concepts, LLC

Bruce Webb
Airbus Helicopters, Inc.

Kevin McCarthy
Naval Air Warfare Center Aircraft Division

Wednesday, 8 January 2020

336-ACD-13 — **Aircraft Design/Analysis Methods and Validation** — **Columbia 37**

Chaired by: W. ANEMAAT, DARcorporation and S. BRANDT, US Air Force Academy

1430 hrs
AIAA-2020-1258
Development of Simulation Tools for High Fidelity Analysis of Compound Rotorcraft
T. Zhang, G. Barakos, University of Glasgow, Glasgow, United Kingdom

1500 hrs
AIAA-2020-1259
Aircraft Design Weight Methods Comparison and Improvement
B. Basgall, W. Liu, T. Cassady, W. Anemaat, Design, Analysis and Research Corporation, Lawrence, KS

1530 hrs
AIAA-2020-1260
High-Lift Actuation Weight Estimation Using Low-Cost Methods
B. Moss, A. Da Ronch, University of Southampton, Southampton, United Kingdom; N. Tyler, Moog, Inc., Wolverhampton, United Kingdom

1600 hrs
AIAA-2020-1261
Flying Qualities Prediction Tool for Aerial Refuelling Operational Compatibility Assessment
L. Peristy, R. Perez, P. Jansen, Royal Military College of Canada, Kingston, Canada

1630 hrs
AIAA-2020-1262
Validation and Refinement of an Aircraft Design and Optimization Tool, ATLASS
B. Autry, Gulfstream Aerospace Corporation, Savannah, GA

Wednesday, 8 January 2020

337-AFM-12 — **Flight Stability and Control** — **Bayhill 18**

Chaired by: B. LEONHARDT, Northrop Grumman Corporation and K. SHWEYK, Boeing Commercial Aiplanes

1430 hrs
AIAA-2020-1263
Stabilizing a VTOL Freewing Testbed Vehicle in Hover
R. Axten, E. Johnson, Pennsylvania State University, University Park, PA

1500 hrs
AIAA-2020-1264
Control of Adverse Yaw During Roll for a Class of Optimal Lift Distributions
D. Hunsaker, Z. Montgomery, Utah State University, Logan, UT; J. Joo, Air Force Research Laboratory, Wright-Patterson AFB, OH

1530 hrs
AIAA-2020-1265
Trim for Maximum Control Authority using the Attainable Moment Set
C. Varriale, Delft University of Technology, Delft, The Netherlands; M. Voskuijl, Netherlands Defence Academy, Den Helder, The Netherlands; L. Veldhuis, Delft University of Technology, Delft, The Netherlands

1600 hrs
AIAA-2020-1266
Low Lift-to-Drag Morphing Shape Design
R. Dillman, A. Slagle, A. Korzun, R. Lugo, A. Dwyer-Cianciolo, NASA Langley Research Center, Hampton, VA

1630 hrs
AIAA-2020-1267
Real-time Shape Estimation for Flexible Unmanned Air Vehicle via Kalman Filtering
A. Kotikalpudi, Systems Technology, Inc., Hawthorne, CA; D. Schmidt, Schmidt & Associates, Monument, CO; C. Regan, P. Seiler, University of Minnesota, Twin Cities, Minneapolis, MN

1700 hrs
AIAA-2020-1268
Dynamic Stability and Flying Qualities of an Unmanned Airplane as a Flexible Body
A. Martinez, Simón Bolívar University, Venezuela, Venezuela; P. Boschetti, Simón Bolívar University, Naiguata, Venezuela; P. González Ramirez, Technological Institute of Aeronautics (ITA), São José dos Campos, Brazil

Wednesday, 8 January 2020						
338-AFM-13	**InSight Entry, Descent, and Landing Performance**					**Bayhill 19**
Chaired by: R. MADDOCK, NASA-Langley Research Center and A. KORZUN, NASA Langley Research Center						
1430 hrs AIAA-2020-1269 **Insight Entry, Descent, and Landing Pre-Flight Performance Predictions** R. Maddock, A. Dwyer-Cianciolo, D. Litton, C. Zumwalt, NASA Langley Research Center, Hampton, VA	1500 hrs AIAA-2020-1270 **Insight Entry, Descent, and Landing Post-Flight Performance Assessment** R. Maddock, A. Dwyer-Cianciolo, C. Karlgaard, A. Korzun, D. Litton, C. Zumwalt, NASA Langley Research Center, Hampton, VA	1530 hrs AIAA-2020-1271 **Mars InSight Entry, Descent, and Landing Trajectory and Atmosphere Reconstruction** C. Karlgaard, Analytical Mechanics Associates, Inc., Hampton, VA; A. Korzun, M. Schoenenberger, NASA Langley Research Center, Hampton, VA; E. Bonfiglio, D. Kass, M. Grover, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA	1600 hrs AIAA-2020-1272 **Aerodynamic Performance of the 2018 InSight Mars Lander** A. Korzun, R. Maddock, M. Schoenenberger, K. Edquist, C. Zumwalt, NASA Langley Research Center, Hampton, VA; C. Karlgaard, Analytical Mechanics Associates, Inc., Hampton, VA	1630 hrs AIAA-2020-1273 **InSight Aerothermal Environment Assessment** R. Beck, NASA Ames Research Center, Moffett Field, CA; J. Songer, Lockheed Martin Corporation, Littleton, CO; C. Szalai, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA; D. Saunders, C. Karlgaard, Analytical Mechanics Associates, Inc., Virginia Beach, VA; M. Johnson, Lockheed Martin Corporation, Littleton, CO		

Wednesday, 8 January 2020						
339-AMT-11/PC-32	**Velocimetry Techniques II**					**Bayhill 21**
Chaired by: Y. ZHANG, Sandia National Laboratories and D. REESE, NASA Langley Research Center						
1430 hrs AIAA-2020-1274 **Development of long distance 2D micro-molecular tagging velocimetry (μMTV) to measure wall shear stress** C. Fort, M. Andre, P. Bardet, George Washington University, Washington, D.C.	1500 hrs AIAA-2020-1275 **Towards Vibrationally Excited Nitric Oxide Monitoring (VENOM) in a Laminar, Hypersonic Boundary Layer** Z. Buen, C. Broslawski, M. Smotzer, J. Kuszynski, S. North, R. Bowersox, Texas A&M University, College Station, TX	1530 hrs AIAA-2020-1276 **FLEET Velocimetry in the Common Research Model's Wing Wake** D. Reese, P. Danehy, E. Walker, M. Rivers, NASA Langley Research Center, Hampton, VA; W. Goad, Jacobs, Hampton, VA	1600 hrs AIAA-2020-1277 **Preliminaly experiments for visualization of detonation waves propagating inside a rotating-detonation rocket engine by using point-diffraction interferometry** T. Mizukaki, D. Numata, I. Fumihiko, M. Mori, Tokai University, Hiratsuka, Japan; M. Kojima, H. Kawashima, Japan Aerospace Exploration Agency (JAXA), Tsukuba, Japan; et al.	1630 hrs AIAA-2020-1278 **High-Speed 4D Flame-Flow Measurements of a Bluff-Body Stabilized Premixed Flame** J. Reyes, K. Ahmed, University of Central Florida, Orlando, FL; B. Davis, D. Knaus, D. Micka, Creare, Inc., Hanover, NH	1700 hrs AIAA-2020-1279 **A new OH fluorescence signal-to-OH mole fraction conversion model formulation and calibration** L. Angelilli, King Abdullah University of Science and Technology, Thuwal, Saudi Arabia; P. Ciottoli, R. Malpica Galassi, University of Rome "La Sapienza", Rome, Italy; T. Guiberti, W. Boyette, F. Hernandez Perez, King Abdullah University of Science and Technology, Thuwal, Saudi Arabia; et al.	

Wednesday, 8 January 2020		
340-AMT-12 **1430 - 1730 hrs**	**Diagnostics for Pressure Gain Combustion**	**Bayhill 22**

Wednesday, 8 January 2020						
341-AMT-13	**Implementation in Facilities with Unique Measurement Challenges**					**Bayhill 23**
Chaired by: J. JEWELL, Purdue University						
1430 hrs AIAA-2020-1280 **High-Speed X-ray Stereo Digital Image Correlation for Fluid-Structure Interactions in a Shock Tube** J. James, E. Jones, E. Quintana, K. Lynch, B. Halls, J. Wagner, Sandia National Laboratories, Albuquerque, NM	1500 hrs AIAA-2020-1281 **Flow Visualization with Common Path Interferometry in High-Enthalpy Shock Tunnel** H. Tanno, K. Itoh, Y. Kento, K. Yamada, M. Kobayashi, Japan Aerospace Exploration Agency (JAXA), Kakuda, Japan; K. Shimamura, Tsukuba University, Tsukuba, Japan; et al.	1530 hrs AIAA-2020-1282 **Focused Laser Differential Interferometry for Hypersonic Flow Instability Measurements with Contoured Tunnel Windows** E. Benitez, J. Jewell, S. Schneider, Purdue University, West Lafayette, IN	1600 hrs AIAA-2020-1283 **Spatially-Resolved Surface Temperature Measurements of a Rocket Motor Nozzle using an Acousto-optic Modulator** Y. Mazumdar, Georgia Institute of Technology, Atlanta, GA; J. Wagner, D. Fredrick, D. Guildenbecher, Sandia National Laboratories, Albuquerque, NM; T. Hendricks, Exo-Atmospheric Technologies, Brookfield, WI			

Wednesday, 8 January 2020

342-APA-26	Aerodynamic Design and Analysis I					Coral Spring I
Chaired by: J. AZEVEDO, Instituto de Aeronautica e Espaco and N. HALL, Lockheed Martin Corporation						
1430 hrs AIAA-2020-1284 **Blade Element Theory Coupled with CFD Applied to Optimal Design of Rotor for Mars Exploration Helicopter** K. Uwatoko, M. Kanazaki, Tokyo Metropolitan University, Hino, Japan; H. Nagai, K. Fujita, Tohoku University, Sendai, Japan; A. Oyama, Japan Aerospace Exploration Agency (JAXA), Sagamihara, Japan	1500 hrs AIAA-2020-1285 **Aerodynamic analysis and optimization of a boxwing architecture for commercial airplanes** M. Carini, M. Meheut, S. Kanellopoulos, ONERA, Paris, France	1530 hrs AIAA-2020-1286 **Progress towards a Rapid Method for Conceptual Aerodynamic Design for Transonic Cruise** S. Prince, D. Di Pasquale, K. Garry, Cranfield University, Cranfield, United Kingdom	1600 hrs AIAA-2020-1287 **A General Approach to Lifting-Line Theory, Applied to Wings with Sweep** J. Reid, D. Hunsaker, Utah State University, Logan, UT	1630 hrs AIAA-2020-1288 **Design of a Deep Learning Based Nonlinear Aerodynamic Surrogate Model for UAVs** H. Karali, M. Demirezen, M. Yukselen, Istanbul Technical University, Istanbul, Turkey; G. Inalhan, Cranfield University, Bedford, United Kingdom		

Wednesday, 8 January 2020

343-APA-27	Special Session: Slotted, Natural-Laminar-Flow Airfoil Development from the NASA University Leadership Initiative II					Florida Ballroom B
Chaired by: J. CODER, University of Tennessee and P. ANSELL, University of Illinois at Urbana-Champaign						
1430 hrs AIAA-2020-1289 **High-Lift Simulations of Slotted, Natural-Laminar-Flow Airfoils with Drooped Leading Edge** H. Ortiz-Melendez, J. Coder, University of Tennessee, Knoxville, Knoxville, TN	1500 hrs AIAA-2020-1290 **Leading Edge Devices for Enhanced High-Lift and Reduced Noise** A. Shmilovich, E. Dickey, The Boeing Company, Huntington Beach, CA	1530 hrs AIAA-2020-1291 **Characterization of Inclined Oscillating Jet and Crossflow Interaction for Use in Active Flow Control** V. Awate, P. Ansell, University of Illinois, Urbana-Champaign, Urbana, IL	1600 hrs AIAA-2020-1292 **Adjoint Based Optimization of a Slotted Natural Laminar Flow Wing for Ultra Efficient Flight** D. Mavriplis, Z. Yang, E. Anderson, University of Wyoming, Laramie, Laramie, WY			

Wednesday, 8 January 2020

344-APA-28	Special Sessions in Honor of Antony Jameson's 85th Birthday III					Barrel Spring II
Chaired by: L. MARTINELLI, Princeton University and J. VASSBERG						
1430 hrs Oral Presentation **On the Application of PyFR to Simulation of Turbulent Flows (Invited)** P. Vincent, Imperial College London, London, United Kingdom	1500 hrs Oral Presentation **Full Spaced Discrete-Adjoint Approach to Aerodynamic Design Optimization (Invited)** S. Nadarajah, D. Shi-Dong, McGill University, Montréal, Canada	1530 hrs Oral Presentation **Shock tracking using an optimization-based, r-adaptive, high-order discontinuous Galerkin method (Invited)** P. Persson, University of California, Berkeley, Berkeley, CA	1600 hrs Oral Presentation **Versatile mixed methods for the incompressible Navier-Stokes equations" (Invited)** D. Williams, Pennsylvania State University, University Park, PA	1630 hrs Oral Presentation **Large Eddy Simulation of turbulent flows past counter rotating propellers using a high-order sliding-mesh spectral difference method (Invited)** C. Liang, George Washington University, Washington, D.C.	1700 hrs Oral Presentation **Overnight Industrial LES for External Aerodynamics (Invited)** R. Lohner, George Mason University, Fairfax, VA	

Wednesday, 8 January 2020

345-APA-29/MDO-13	Aerodynamic Design Optimization I					Florida Ballroom C
Chaired by: A. ELMILIGUI, NASA Langley Research Center and A. MITTAL, Convergent Science						
1430 hrs AIAA-2020-1293 **Truncated-Newton Method with Adjoint-based Hessian-vector Product for Aerodynamic Shape Optimization Problems** W. Peng, S. Nadarajah, McGill University, Montréal, Canada	1500 hrs AIAA-2020-1294 **Comparing Matrix-based and Matrix-free Discrete Adjoint Approaches to the Euler Equations** L. Kedward, C. Allen, T. Rendall, University of Bristol, Bristol, United Kingdom	1530 hrs AIAA-2020-1295 **Multi-Fidelity Wing Optimization Utilizing 2D to 3D Mapping in Transonic Conditions** T. MacDonald, J. Alonso, Stanford University, Stanford, CA	1600 hrs AIAA-2020-1296 **Airfoil Optimization Using Cross-Entropy Method on Conformal Mapping** B. Rafferty, Stanford University, Stanford, CA	1630 hrs AIAA-2020-1297 **Optimizing NACA Airfoil Thickness Function Parameters for Maximum Lift-to-Drag Ratio** R. Bourisli, F. Hamadeh, Kuwait University, Safat, Kuwait		

Wednesday, 8 January 2020

346-AS-4 — **Morphing Rotor Blades** — **Celebration 4**

Chaired by: B. WOODS and A. CHATTOPADHYAY, Arizona State University

1430 hrs	1500 hrs	1530 hrs	1600 hrs	1630 hrs	1700 hrs
AIAA-2020-1298	AIAA-2020-1299	AIAA-2020-1300	AIAA-2020-1301	AIAA-2020-1302	AIAA-2020-1303
Numerically Efficient Three-Dimensional Fluid-Structure Interaction Analysis for Composite Camber Morphing Aerostructures	**Shape memory alloys compact actuators for aerodynamic surfaces twisting**	**Wind Tunnel Comparison of Flapped and FishBAC Camber Variation for Lift Control**	**Preliminary Design of a TE Morphing Surface for Rotorcraft**	**Numerical Investigation of the Effects of Dynamic Camber Variation on the Airfoil Characteristics of a Pitching Rotor Airfoil**	**Passive Energy Balancing for Morphing Rotorcraft Actuation: Integration and optimisation**
A. Rivero, J. Cooper, B. Woods, University of Bristol, Bristol, United Kingdom	S. Ameduri, B. Galasso, M. Ciminello, A. Concilio, Italian Aerospace Research Center (CIRA), Capua, Italy	A. Rivero, S. Fournier, University of Bristol, Bristol, United Kingdom; M. Manolesos, Swansea University, Swansea, United Kingdom; J. Cooper, B. Woods, University of Bristol, Bristol, United Kingdom	Y. Zahoor, R. De Breuker, Delft University of Technology, Delft, The Netherlands; M. Voskuijl, Netherlands Defence Academy, Delft, The Netherlands	A. Abdelmoula, S. Platzer, M. Hajek, J. Rauleder, Technical University of Munich, Munich, Germany	C. Wang, J. Zhang, Swansea University, Swansea, United Kingdom; M. Amoozgar, University of Huddersfield, Huddersfield, United Kingdom; A. Shaw, M. Friswell, Swansea University, Swansea, United Kingdom; B. Woods, University of Bristol, Bristol, United Kingdom

Wednesday, 8 January 2020

347-F360-6 — **Forum 360: Idea Challenge** — **Regency Ballroom Q**

1430 - 1630 hrs

Moderator: Michele Miller, Ball Aerospace

Team Orbis:	Team The Pangea Project:	Team Helios:	Team Slingshot:	Team ASTRO:	Team SWARM:
Elizabeth Balga, The Boeing Company	Emily Flaherty-Woods, Collins Aerospace	Amanda Ireland, The Boeing Company	Jason Gardellis, Rolls-Royce Corporation	Lyndy Axon, The Boeing Company	Barndon Burroughs, The Boeing Company
Jannine Rouw, Ball Aerospace	Nathaniel Keyek-Franssen, The Boeing Company	Christopher Rouw, Ball Aerospace	Amani Garvin, Ball Aerospace	Karenna Buco, Aerojet Rocketdyne	Heather Kline, NASA Langley Research Center
Margaret Shaw-Lecerf, Lockheed Martin Corporation	Conner Knickel, Ball Aerospace	Joseph Schmitz, Lockheed Martin Corporation	Anjaney Kottapalli, Lockheed Martin Company	Becky Mitchell, Lockheed Martin Corporation	Matthew Marcus, NASA Goddard Space Flight Center
Katrina Teo, University of Washington	Trevor Perkins, Lockheed Martin Corporation		Brandon Smith, The Boeing Company	Karen Rucker, Ball Aerospace	Taylor Zedosky, Ball Aerospace

Wednesday, 8 January 2020

348-FD-48 — **NASA Juncture Flow I** — **Orlando Ballroom M**

Chaired by: M. MALIK, NASA-Langley Research Center and M. ROGERS, NASA-Ames Research Center

1430 hrs	1500 hrs	1530 hrs	1600 hrs	1630 hrs		
Oral Presentation	AIAA-2020-1304	AIAA-2020-1305	AIAA-2020-1306	AIAA-2020-1307		
Overview of the NASA Juncture Flow Project	**Reynolds-Averaged Navier-Stokes Computations of the NASA Juncture Flow Model Using FUN3D and OVERFLOW (Invited)**	**Juncture Flow Computations using kL-Based Turbulence Models (Invited)**	**Reynolds-Stress Model Computations of the NASA Juncture Flow Experiment (Invited)**	**Wall-modeled LES of the NASA Juncture Flow Experiment (Invited)**		
C. Rumsey, NASA Langley Research Center, Hampton, VA	C. Rumsey, NASA Langley Research Center, Hampton, VA; H. Lee, T. Pulliam, NASA Ames Research Center, Moffett Field, CA	K. Abdol-Hamid, N. Ahmad, J. Carlson, R. Biedron, NASA Langley Research Center, Hampton, VA	B. Eisfeld, V. Togiti, S. Braun, A. Stuermer, German Aerospace Center (DLR), Braunschweig, Germany	P. Iyer, National Institute of Aerospace, Hampton, VA; M. Malik, NASA Langley Research Center, Hampton, VA		

Wednesday, 8 January 2020

349-FD-49 — **Transition Open Forum** — **Plaza Ballroom J**

1430 - 1730 hrs

Wednesday, 8 January 2020

350-FD-50	Transonic Shock-Induced Separated Flow					Plaza Ballroom H
Chaired by: K. LYNCH and N. MILLER, Sandia National Labs						
1430 hrs AIAA-2020-1308 **A CFD Validation Challenge for Transonic, Shock-Induced Separated Flow: Approach and Metrics (Invited)** S. Beresh, M. Barone, K. Dowding, K. Lynch, N. Miller, Sandia National Laboratories, Albuquerque, NM	1500 hrs AIAA-2020-1309 **A CFD Validation Challenge for Transonic, Shock-Induced Separated Flow: Experimental Characterization (Invited)** K. Lynch, B. Lance, G. Lee, Sandia National Laboratories, Albuquerque, NM; J. Naughton, University of Wyoming, Laramie, WY; N. Miller, M. Barone, Sandia National Laboratories, Albuquerque, NM; et al.	1530 hrs AIAA-2020-1310 **Applying High-Order, Adaptively-Refined, Finite-Volume Methods to Discrete Structured Representations of Arbitrary Geometry** N. Overton-Katz, X. Gao, S. Guzik, Colorado State University, Fort Collins, CO	1600 hrs AIAA-2020-1311 **Laminar-Turbulent Transition Modeling with a Reynolds Stress Model for Anisotropic Flow Characteristics** S. Endo, T. Sujisakulvong, Y. Kuya, T. Ariki, K. Sawada, Tohoku University, Sendai, Japan	1630 hrs AIAA-2020-1312 **Modeling Tensile Tests of a Braided Parachute Suspension Line using a Mesomechanical Finite Element Model** C. Barry, B. Olson, University of Massachusetts, Lowell, Lowell, MA; K. Bergeron, Army Combat Capabilities Development Command, Natick, MA; D. Willis, J. Sherwood, University of Massachusetts, Lowell, Lowell, MA		

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351-FD-51	Discontinuous Galerkin Methods I					Rainbow Spring II
Chaired by: M. GALBRAITH, Massachusetts Institute of Technology and M. FRANCIOLINI, NASA Ames Research Center						
1430 hrs AIAA-2020-1313 **A Discontinuous Galerkin method for Non-Equilibrium Multi-Material Flows on Unstructured Grids** A. Pandare, J. Waltz, J. Bakosi, Los Alamos National Laboratory, Los Alamos, NM	1500 hrs AIAA-2020-1314 **Multigrid preconditioning for a space-time spectral-element discontinuous-Galerkin solver** M. Franciolini, S. Murman, NASA Ames Research Center, Moffett Field, CA	1530 hrs AIAA-2020-1315 **The Moving Discontinuous Galerkin Method with Interface Condition Enforcement for Viscous Flows** A. Kercher, A. Corrigan, D. Kessler, Naval Research Laboratory, Washington, D.C.	1600 hrs AIAA-2020-1316 **A Moving Discontinuous Galerkin Finite Element Method for Conservation Laws** H. Luo, Y. Jiang, North Carolina State University, Raleigh, NC; R. Nourgaliev, Lawrence Livermore National Laboratory, Livermore, CA	1630 hrs AIAA-2020-1317 **Dispersion and dissipation analysis for unphysical modes of high-order discontinuous Galerkin methods** H. Asada, Ritsumeikan University, Kusatu, Japan		

Wednesday, 8 January 2020

352-FD-52	Control-Oriented Modeling of Fluid Flows					Plaza Ballroom K
Chaired by: K. DURAISAMY and X. AN, Princeton University						
1430 hrs AIAA-2020-1318 **Impact of Symmetrization on the Robustness of POD-Galerkin ROMs for Compressible Flows** E. Rezaian, M. Wei, Kansas State University, Manhattan, KS	1500 hrs AIAA-2020-1319 **Toward Model-Based Control of Near-Wall Turbulent Coherent Structures** A. Tsolovikos, S. Suryanarayanan, E. Bakolas, D. Goldstein, University of Texas, Austin, Austin, TX	1530 hrs AIAA-2020-1320 **Turbulent Drag Reduction on an Aircraft Wing by Wall Jets for Flow Control** M. Varshney, F. Baig, N. Hasan, Aligarh Muslim University, Aligarh, India	1600 hrs AIAA-2020-1321 **Incrementation of Lift-to-Drag Ratio for a Wing Using Thermal Forcing** M. Varshney, A. Varshney, F. Baig, Aligarh Muslim University, Aligarh, India			

Wednesday, 8 January 2020

353-FD-53	Vortex Dynamics III					Blue Spring I
Chaired by: P. SELLAPPAN, Florida State University and S. NARSIPUR, North Carolina State University						
1430 hrs AIAA-2020-1322 **Dynamics of the Slanted Cylinder Afterbody Vortices** F. Zigunov, P. Sellappan, F. Alvi, Florida State University, Tallahassee, FL	1500 hrs AIAA-2020-1323 **High-Fidelity Analysis of Unsteadiness Past an Upswept Bluff Body** M. Aultman, R. Ranjan, D. Gaitonde, Ohio State University, Columbus, OH	1530 hrs AIAA-2020-1324 **Convolutional Neural Network Predictions of Excitation and Vortex Frequency Interactions on a Cylinder in Laminar Flow** J. Thress, R. Djeddi, K. Ekici, University of Tennessee, Knoxville, Knoxville, TN	1600 hrs AIAA-2020-1325 **Drag Coefficients of Circular Cylinders with Fineness Ratios of less than 0.50 measured by 0.1 and 0.3 m Magnetic Suspension and Balance Systems** M. Kuwata, S. Yokota, H. Sawada, Y. Abe, A. Yakeno, T. Nonomura, Tohoku University, Sendai, Japan; et al.			

Wednesday, 8 January 2020						
354-FD-54	**Multiphase Flows II**					**Blue Spring II**
Chaired by: E. DEMAURO, Rutgers, The State University of New Jersey and D. LEVIN, University of Illinois						
1430 hrs AIAA-2020-1326 **The dynamics of inertial particles in underexpanded jets: An experimental study** T. Kim, R. Ni, Johns Hopkins University, Baltimore, MD; J. Capecelatro, Y. Yao, G. Shallcross, University of Michigan, Ann Arbor, Ann Arbor, MI; M. Mehta, NASA Marshall Space Flight Center, Huntsville, AL; et al.	1500 hrs AIAA-2020-1327 **The dynamics of inertial particles in under-expanded jets: A numerical study** Y. Yao, G. Shallcross, University of Michigan, Ann Arbor, Ann Arbor, MI; R. Ni, T. Kim, Johns Hopkins University, Baltimore, MD; M. Mehta, NASA Marshall Space Flight Center, Huntsville, AL; J. Rabinovitch, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA; et al.	1530 hrs AIAA-2020-1328 **Modulation of Coherent Structures by Inertial Particles in a Turbulent Channel Flow** H. Dave, M. Kasbaoui, Arizona State University, Tempe, AZ	1600 hrs AIAA-2020-1329 **On the prediction of turbulent kinetic energy in channel flow using wall-modeled large eddy simulations** M. Sayed, Paul Scherrer Institute, Villigen, Switzerland; M. Hadziabdic, University of Sarajevo, Sarajevo, Bosnia and Herzegovina; A. Dehbi, B. Niceno, K. Mikityuk, Paul Scherrer Institute, Villigen, Switzerland	1630 hrs AIAA-2020-1330 **Limitations with using RANS to Predict Airborne Particle Distribution and Scalar Mixing in a Turbulent Pipe Flow** G. Geiger, P. Gnanaselvam, N. Plewacki, N. Libertowski, J. Bons, Ohio State University, Columbus, OH		

Wednesday, 8 January 2020						
355-FD-55	**RANS/LES/Hybrid Turbulence Modeling and Applications II**					**Rainbow Spring I**
Chaired by: S. GUZIK, Stephen Guzik and J. EDWARDS						
1430 hrs AIAA-2020-1331 **RANS and LES Simulation of a Mach 7 Axisymmetric Flare Interaction** C. Jordan, G. Buss, J. Edwards, North Carolina State University, Raleigh, NC; D. Stefanski, University of Tennessee, Knoxville, Knoxville, TN	1500 hrs AIAA-2020-1332 **Analysis of turbulence models to predict fin-on-cylinder shock boundary layer interactions** J. Pickles, B. Mettu, V. Narayanaswamy, P. Subbareddy, North Carolina State University, Raleigh, NC; J. Vasile, J. DeSpirito, Army Research Laboratory, Aberdeen Proving Ground, MD	1530 hrs AIAA-2020-1333 **Implicit Large-Eddy Simulations of Hot and Cold Supersonic Jets in Loci-CHEM** C. Morris, NASA Marshall Space Flight Center, Huntsville, AL; E. Luke, Mississippi State University, Mississippi State, MS	1600 hrs AIAA-2020-1334 **Comparison of Flow Characteristics of Single and Twin Rectangular Jets Using OVERFLOW Code** D. Kalagotla, A. Karnam, E. Gutmark, University of Cincinnati, Cincinnati, OH	1630 hrs AIAA-2020-1335 **LES Analysis of Transverse Jet Mixing in Supersonic Free-stream Turbulence** Y. Nagata, S. Yokoi, R. Aoki, T. Kouchi, S. Yanase, Okayama University, Okayama, Japan		

Wednesday, 8 January 2020						
356-GNC-22/IS-11	**Advances in Adaptive Control for Aerospace Systems IV (Invited)**					**Celebration 9**
Chaired by: A. KORU and J. MUSE, AFRL/RQQA						
1430 hrs AIAA-2020-1336 **Design and Flight Evaluation of Deep Model Reference Adaptive Controller (Invited)** G. Joshi, J. Virdi, G. Chowdhary, University of Illinois, Urbana-Champaign, Urbana, IL	1500 hrs AIAA-2020-1337 **Limited Authority Adaptive Control Architectures with Dynamic Inversion or Explicit Model Following (Invited)** J. Lewis, E. Johnson, Pennsylvania State University, University Park, PA	1530 hrs AIAA-2020-1338 **Quantification of Tolerable Parametric and Dynamic Uncertainty for Robust MRAC Systems (Invited)** M. Fravolini, N. Cartocci, University of Perugia, Perugia, Italy; K. Dogan, T. Yucelen, University of South Florida, Tampa, FL	1600 hrs AIAA-2020-1339 **Resilient Spacecraft Formation Control Under Malfunctioning Communication (Invited)** S. Phillips, C. Petersen, Air Force Research Laboratory, Kirtland AFB, NM; R. Fierro, University of New Mexico, Albuquerque, Albuquerque, NM	1630 hrs AIAA-2020-1340 **Experimental Results on Performance Guarantees for Human-in-the-Loop Systems with Inner and Outer Feedback Control Loops (Invited)** A. Koru, University of South Florida, Tampa, FL; E. Arabi, University of Michigan, Ann Arbor, Ann Arbor, MI; K. Dogan, T. Yucelen, University of South Florida, Tampa, FL; R. Sipahi, Northeastern University, Boston, MA; Y. Yildiz, Bilkent University, Ankara, Turkey	1700 hrs AIAA-2020-1341 **Robustness of Adaptive Control Augmentation of Linear Infinite Dimensional Systems Using the Kato Gap Metric (Invited)** M. Balas, University of Tennessee, Tullahoma, Tullahoma, TN; J. Jaisle, F. Holzapfel, Technical University of Munich, Munich, Germany	

Wednesday, 8 January 2020						
357-GNC-23	**Navigation, Estimation, Sensing, and Tracking II**					**Bayhill 33**
Chaired by: L. POLLINI, University of Pisa and K. HONG						
1430 hrs AIAA-2020-1342 **Informative Planning of Mobile Sensor Networks in GPS-Denied Environments** Y. Min, S. Park, H. Choi, Korea Advanced Institute of Science and Technology, Daejeon, South Korea	1500 hrs AIAA-2020-1343 **UnrealNavigation: Simulation Software for testing SLAM in Virtual Reality** A. Bettens, B. Morrell, University of Sydney, Sydney, Australia; M. Coen, N. McHenry, Texas A&M University, College Station, TX; X. Wu, University of Sydney, Sydney, Australia; P. Gibbens, University of Newcastle, Newcastle, Australia; et al.	1530 hrs AIAA-2020-1344 **Vision-based Navigation using Gaussian Mixture Model of Terrain Features** K. Hong, S. Kim, H. Bang, Korea Advanced Institute of Science and Technology, Daejeon, South Korea	1600 hrs AIAA-2020-1345 **A Hybrid Approach to Detection and Tracking of Unmanned Aerial Vehicles** N. Espsoito, U. Fontana, G. D'autilia, L. Bianchi, M. Alibani, L. Pollini, University of Pisa, Pisa, Italy	1630 hrs AIAA-2020-1346 **Navigation Based Path Planning by Optimal Control Theory** S. Nolan, M. Grant, Purdue University, West Lafayette, IN; A. Rutkowski, Air Force Research Laboratory, Eglin AFB, FL		

Wednesday, 8 January 2020						
358-GNC-24	**Spacecraft and Launch Guidance, Navigation, and Control II**					**Bayhill 31**
Chaired by: C. RESTREPO, NASA/GSFC and L. MASSOTTI, European Space Agency (ESA)						
1430 hrs AIAA-2020-1347 **Autonomous Optical Navigation for Resident Space Object Exploration** A. Heintz, M. Peck, Cornell University, Ithaca, NY	1500 hrs AIAA-2020-1348 **Generating Exploration Mission-3 Trajectories to a 9:2 NRHO using Machine Learning** E. Guzman, NASA Johnson Space Center, Houston, TX	1530 hrs AIAA-2020-1349 **Safely Planetary Landing Guidance Closest to Hazard Area Considering Navigation Error Using Convex Optimization** H. Arai, T. Tsuchiya, University of Tokyo, Tokyo, Japan; S. Sakai, Japan Aerospace Exploration Agency (JAXA), Sagamihara, Japan	1600 hrs AIAA-2020-1350 **Iteratively feasible optimal spacecraft guidance with non-convex path constraints using convex optimization** G. Misra, X. Bai, Rutgers University, New Brunswick, NJ	1630 hrs AIAA-2020-1351 **Real Time Powered Descent Guidance Algorithm for Mars Pinpoint Landing with Inequality Constraints** S. Swaminathan, R. U.P, Indian Space Research Organisation, Trivandrum, India; D. Ghose, Indian Institute of Science, Bengaluru, India	1700 hrs AIAA-2020-1352 **Multi-User System for Earth Sensing Attitude Estimation Analysis Using Spectral Decomposition** M. Whorton, University of Tennessee, Knoxville, Tullahoma, TN; J. Crassidis, University of Buffalo, Buffalo, NY	

Wednesday, 8 January 2020						
359-GT-6	**Novel Facility Development, Improvement, and Characterization**					**Bayhill 24**
Chaired by: R. SCHMIT, USAF/AFRL and P. GOULDING, National Full-Scale Aerodynamics Complex - AEDC						
1430 hrs AIAA-2020-1353 **Design and Demonstration of Air-Cycle Machine for Engine Testing at Altitude Conditions** C. Kerner, A. Brown, J. Baranski, Innovative Scientific Solutions, Inc., Dayton, OH; M. Fernelius, Air Force Research Laboratory, Wright-Patterson AFB, OH	1500 hrs AIAA-2020-1354 **Design and Analysis of an Additive Manufactured Supersonic Wind Tunnel** M. Gazella, J. Hill, Air Force Research Laboratory, Wright-Patterson AFB, OH; S. Chriss, A. Abel, S. Gunasekaran, University of Dayton, Dayton, OH	1530 hrs AIAA-2020-1355 **Redesign of a Sting Mount Pitch Actuator for Improved Data Quality** M. Miller, E. Leber, L. Brown, E. White, Texas A&M University, College Station, TX	1600 hrs AIAA-2020-1356 **A Preliminary Study on Transonic Shock Tube Airfoil Flows with Gurney Flap by utilizing PDI** M. Kashitani, M. Taguchi, N. Duong, A. Oomori, M. Nishiyama, National Defense Academy, Yokosuka, Japan; H. Tanno, Japan Aerospace Exploration Agency (JAXA), Kakuda, Japan			

Wednesday, 8 January 2020						
360-GTE-10	**Combustors II**					**Barrel Spring I**
Chaired by: P. PAL and C. XU, Argonne National Laboratory						
1430 hrs AIAA-2020-1357 **An experimental study of subcritical transition into thermoacoustic oscillations in a swirl stabilized model gas turbine combustor** E. Karlis, Y. Hardalupas, A. Taylor, Imperial College London, London, United Kingdom	1500 hrs AIAA-2020-1358 **Characterization of a Laser Diagnostic Sensor for Gas Turbine Combustor Flows** K. Thurmond, S. Park, S. Vasu, University of Central Florida, Orlando, FL	1530 hrs AIAA-2020-1359 **Experimental and Numerical Studies of SR30 Turbojet Engine Combustion** M. Ilie, D. Mothershed, T. Wiley, D. Grall, C. Carapia, M. Kilpatrick, Georgia Southern University, Statesboro, GA; et al.	1600 hrs AIAA-2020-2300 **Recuperator for Model 250 Engine** D. Knaus, J. Cox, V. Archambault-Leger, M. Izenson, Creare LLC, Hanover, NH; J. Sanders, Edare Incorporated, Lebanon, NH; C. Heathco, New Centerline Design, Indianapolis, IN; et al.			

Wednesday, 8 January 2020						
361-HIS-2	**History of Aerospace II: Astronautics**					**Plaza Ballroom F**
Chaired by: R. HALLION, Fellow AIAA, Fellow RAeS, Fellow RHistS and K. BURNS						
1430 hrs AIAA-2020-1360 **Designing the Smallest Manned Spacecraft: David Clark Company and the Evolution of the Space Suit** C. Paige, Massachusetts Institute of Technology, Cambridge, MA	1500 hrs AIAA-2020-1361 **Evolution of the Flight Crew and Mission Control Relationship** M. Nasr, Massachusetts Institute of Technology, Cambridge, MA	1530 hrs AIAA-2020-1362 **Methodology for Choosing a Contractor for the Apollo Spacecraft Command and Service Module** J. Paquin, U.S. Military Academy, West Point, NY	1600 hrs AIAA-2020-1363 **Oliver Evans' Flour Mill and Tomorrow's Orbital Factory Floor** C. Vono, Self, Ogden, UT	1630 hrs AIAA-2020-1364 **The Advent of Space Law: How the detonation of Ivy Mike led to a miraculous international treaty** C. Brazeal , University of Alabama, Tuscaloosa, Tuscaloosa, AL		

Wednesday, 8 January 2020

362-HSABP-6 — **Numerical Analysis of Ramjet/Scramjet Engines II** — **Plaza Ballroom G**

Chaired by: X. WANG, Florida Institute of Technology and J. FULTON, Pratt & Whitney

1430 hrs	1500 hrs	1530 hrs	1600 hrs			
AIAA-2020-1365	AIAA-2020-1366	AIAA-2020-1367	AIAA-2020-1368			
Numerical Investigation of Scaling Effects on a Ramjet-Powered Projectile	**Large Eddy Simulation of an Optimized Highly-Compact Supersonic Inlet Featuring Internal Compression Spikes**	**Study of Pressure Oscillations in Open Strut Cavity**	**Separation Control Inside a Rectangular Supersonic Inlet Using Dielectric Barrier Discharge Plasma Actuators**			
A. Vedam, W. Engblom, Embry-Riddle Aeronautical University, Daytona Beach, FL	S. Barr, B. Muralidharan, N. Sinha, Combustion Research and Flow Technology, Inc., Pipersville, PA	A. Dhankarghare, T. Muruganandam, T. Jayachandran, Indian Institute of Technology Madras, Chennai, India	C. Porrello, S. Roy, University of Florida, Gainesville, Gainesville, FL; R. Pimentel, Defense Research and Development Canada, Quebec, Canada			

Wednesday, 8 January 2020

363-HUB-10 — **2020 Propulsion and Energy Forum: Trumpeting the Future of Propulsion and Energy in the Big Easy** — **the HUB**

1430 - 1500 hrs

Hear about current activities, planning, and programming for the upcoming Propulsion and Energy Forum in New Orleans, LA. Offer your feedback and ideas.

Wednesday, 8 January 2020

364-IS-12 — **Probabilistic and Rule-Based Systems** — **Celebration 10**

Chaired by: J. SHAH, MIT - Massachusetts Institute of Technology

1430 hrs	1500 hrs	1530 hrs	1600 hrs	1630 hrs	1700 hrs	
AIAA-2020-1369	AIAA-2020-1370	AIAA-2020-1371	AIAA-2020-1372	AIAA-2020-1373	AIAA-2020-1374	
Linear-Gaussian Analysis of Information-based Decentralized Data Fusion	**A Multi-Target Tracker based on Gaussian Mixture PHD Filter with Jump Markov System Models**	**Distributed Computational Guidance for High-Density Urban Air Mobility with Cooperative and Non-Cooperative Collision Avoidance**	**UAS Conflict Resolution Integrating a Risk-Based Operational Safety Bound as Airspace Reservation with Reinforcement Learning**	**Hybrid Immunized Swarm Optimization Concept for Resilient Coordinated Missions**	**Database-driven Safe Flight Envelope Protection for Impaired Aircraft**	
O. Dagan, N. Ahmed, University of Colorado, Boulder, Boulder, CO	D. Kim, I. Hwang, Purdue University, West Lafayette, IN	J. Bertram, P. Wei, Iowa State University, Ames, IA	J. Hu, Y. Liu, Arizona State University, Tempe, AZ	D. Festa, H. Moncayo, Embry-Riddle Aeronautical University, Daytona Beach, FL	Y. Zhang, Y. Huang, Q. Chu, C. de Visser, Delft University of Technology, Delft, The Netherlands	

Wednesday, 8 January 2020

365-IS-13 — **Learning Reasoning and Data Driven Systems I** — **Celebration 11**

Chaired by: A. YUCEL, Lockheed Martin Aeronautics and Y. WAN, University of Texas, Arlington

1430 hrs	1500 hrs	1530 hrs	1600 hrs	1630 hrs		
AIAA-2020-1375	AIAA-2020-1376	AIAA-2020-1377	AIAA-2020-1378	AIAA-2020-1379		
A Machine Learning Based Data Association Approach for Space Situational Awareness	**Applications of Machine Learning and Monocular Vision for Autonomous On-Orbit Proximity Operations**	**Iterative Reward Learning for Robotic Exploration**	**Towards Self-confidence-based Adaptive Learning for Lunar Exploration**	**Semi-Autonomous Robotic Surgery for Space Exploration Missions**		
S. Krishnaswamy, M. Kumar, Ohio State University, Columbus, OH	N. Dhamani, G. Martin, C. Schubert, P. Singh, N. Hatten, M. Akella, University of Texas, Austin, Austin, TX	A. Acharya, S. Wakayama, B. Hayes, N. Ahmed, University of Colorado, Boulder, Boulder, CO	B. Mellinkoff, N. Ahmed, J. Burns, University of Colorado, Boulder, Boulder, CO	E. Sneath, Orbit Logic, Inc., Greenbelt, MD; C. Korte, University of Cincinnati, Cincinnati, OH; G. Schaffner, Stress Engineering Services, Mason, OH		

Wednesday, 8 January 2020

366-MAT-9 — **Multiscale and Multi-Physics Modeling I** — **Celebration 6**

Chaired by: G. SEIDEL, Virginia Polytechnic Institute and State Universit and D. ZHANG, University of Connecticut and D. ZHANG

1430 hrs	1500 hrs	1530 hrs	1600 hrs			
AIAA-2020-1380	AIAA-2020-1381	AIAA-2020-1382	AIAA-2020-1383			
Multiscale Modeling of Damage Response in Nanocomposites Reinforced with Carbon Nanotubes	**Multiscale Micromorphic Theory and Simulation with Co-existing Molecular and Continuum Time Scales**	**Multiscale Thermomechanical Damage Model with Internal State Variables for Ceramic Matrix Composites**	**A new approach for constitutive modeling of thin-walled composite structures**			
N. Genckal, G. Seidel, Virginia Polytechnic Institute and State University, Blacksburg, VA	C. Park, J. Jung, T. Park, G. Yun, Seoul National University, Seoul, South Korea	T. Skinner, A. Chattopadhyay, Arizona State University, Tempe, AZ	A. Deo, W. Yu, Purdue University, West Lafayette, IN			

Wednesday, 8 January 2020						
367-MAT-10	**Fatigue and Fracture I**					**Celebration 13**
Chaired by: P. DAVIDSON, University of Michigan and R. FERTIG, University of Wyoming						
1430 hrs AIAA-2020-1384 **Quasi-static and Fatigue Delamination at Tape/Fabric Interfaces** C. Davila, J. Ratcliffe, NASA Langley Research Center, Hampton, VA	1500 hrs AIAA-2020-1386 **A computational study to investigate the effect of defect geometries on the fatigue crack driving forces in powder-bed AM materials** S. Yeratapally, National Institute of Aerospace, Hampton, VA; C. Lang, E. Glaessgen, NASA Langley Research Center, Hampton, VA	1530 hrs AIAA-2020-1387 **Toughening of Boron Carbide Composites with Hierarchical Microstructuring** J. Dai, J. Singh, N. Yamamoto, Pennsylvania State University, University Park, PA	1600 hrs AIAA-2020-1388 **Mode II Fracture Toughness Recovery of CFRP Composite Using Thermoplastic Shape Memory Polymer Healant** B. Jony, S. Mulani, S. Roy, University of Alabama, Tuscaloosa, Tuscaloosa, AL			

Wednesday, 8 January 2020						
368-MDO-14	**AFRL EXPEDITE MDAO II and Effectiveness-Based Design**					**Orlando Ballroom N**
Chaired by: R. KOLONAY, AFRL/RQVC and C. DAVIES, Lockheed Martin Aeronautics						
1430 hrs AIAA-2020-1389 **Application of ModelCenter to Real World Distributed and Parallel Execution Challenges** M. Haisma, A. Ko, Phoenix Integration, Inc., Blacksburg, VA; M. Levy, Lockheed Martin Corporation, Palmdale, CA	1500 hrs AIAA-2020-1390 **Expanded MDO for Effectiveness Based Design Technologies: The EXPEDITE Program and Successes with ESTECO Technologies** K. Mull, Lockheed Martin Corporation, Palmdale, CA	1530 hrs AIAA-2020-1391 **Lockheed Martin Conceptual Design Modeling in the Dassault Systemes 3DEXPERIENCE® Platform** A. Suydam, Lockheed Martin Corporation, Fort Worth, TX; J. Pyles, Dassault Group, Johnston, RI	1600 hrs AIAA-2020-1392 **Air-Racer Design Exploration using Latin Hypercube and Genetic Algorithm Methods** S. Burton, American Optimization, LLC, Springboro, OH; J. Kao, University of Dayton, Dayton, OH; T. White, G. Reich, R. Kolonay, Air Force Research Laboratory, Wright-Patterson AFB, OH	1630 hrs AIAA-2020-1393 **Planform Design and Optimization of Morphing Aircraft** J. Kao, University of Dayton, Dayton, OH; D. Clark, Wright State University, Dayton, OH; S. Burton, American Optimization, LLC, Springboro, OH; T. White, G. Reich, Air Force Research Laboratory, Wright-Patterson AFB, OH		

Wednesday, 8 January 2020						
369-MST-9	**Modeling and Simulation of Aircraft Systems**					**Coral Spring II**
Chaired by: N. MACCHIARELLA, Embry-Riddle Aeronautical University and B. APONSO, NASA Ames Research Center						
1430 hrs AIAA-2020-1394 **Real-Time Simulation of Aerial Refueling Probe-and-Drogue Contact and Engagement Using Simscape Multibody** A. Erickson, A. Chaturvedi, P. Richards, SDI Engineering, Inc., Kirkland, WA	1500 hrs AIAA-2020-1395 **Modeling of Electric Reeling Systems in Aerial Refueling Hose Pods Using Matlab/Simulink** A. Chaturvedi, M. Mor, A. Erickson, P. Richards, SDI Engineering, Inc., Kirkland, WA	1530 hrs AIAA-2020-1396 **Power Flow Method Application on Aircraft Electrical Power Systems** J. Coelho, A. Moraes, Technological Institute of Aeronautics (ITA), São José dos Campos, Brazil; F. Sanchez, Mitsubishi Corporation, Nagoya, Japan	1600 hrs AIAA-2020-1397 **Real-Time Optical Tracking for Store Separation Testing in Wind Tunnel** Y. Mebarki, S. Brhane, S. Rutherford, National Research Council Canada, Ottawa, Canada			

Wednesday, 8 January 2020						
370-MST-10	**Modeling and Simulation of Air Traffic Management**					**Bayhill 30**
Chaired by: N. PRABHAKAR, Argonne National Labs and J. SCHROEDER, Federal Aviation Administration						
1430 hrs AIAA-2020-1398 **Studying the Impacts of the reduction of Minimum Radar Separation on Approach and Tower ATCOs using EUROCONTROL Real Time Simulators** M. Ellejmi, EUROCONTROL, Brétigny-sur-Orge, France; I. De Visscher, J. Toussaint, Wapt, Brussels, Belgium	1500 hrs AIAA-2020-1399 **A Voice-Communication Augmented Simulation Framework for Aircraft Trajectory Simulation** Y. Wang, Y. Pang, Y. Liu, S. Gorceski, Arizona State University, Tempe, AZ; P. Kostiuk, Robust Analytics, Inc., Crofton, MD; P. Menon, Optimal Sythesis Inc., Los Altos, CA	1530 hrs AIAA-2020-1400 **Benefit Assessment of the Integrated Demand Management Concept for Multiple New York Metroplex Airports** H. Yoo, San Jose State University, Moffett Field, CA; A. Evans, Airbus, Sunnyvale, CA; D. Kulkarni, P. Lee, NASA Ames Research Center, Moffett Field, CA; J. Lee, Universities Space Research Association, Moffett Field, CA; M. Wei, NASA Ames Research Center, Moffett Field, CA	1600 hrs AIAA-2020-1401 **A Simulation-Based Aircraft-Centric Assessment of the Circular/Endless Runway Concept** I. Chakraborty, A. Comer, J. Dewey, Auburn University, Auburn, AL	1630 hrs AIAA-2020-1402 **Prediction of Runway Occupancy Time and Runway Exit Distance with Feedforward Neural Networks** N. Mirmohammadsadeghi, A. Trani, Virginia Polytechnic Institute and State University, Blacksburg, VA	1700 hrs AIAA-2020-1403 **Enhancements to the Runway Exit Design Interactive Model Using a Hybrid Simulation Approach for Estimating Runway Occupancy Times at Airports** N. Mirmohammadsadeghi, A. Trani, Virginia Polytechnic Institute and State University, Blacksburg, VA	

Wednesday, 8 January 2020						
371-MVCE-5	**Mesh Generation**					**Bayhill 20**
Chaired by: J. DANNENHOFFER, Syracuse University						
1430 hrs AIAA-2020-1404 **Generation of Exascale Meshes by Subdivision of Coarse Meshes** C. Ollivier Gooch, University of British Columbia, Vancouver, Canada	1500 hrs AIAA-2020-1405 **High-Order Meshing in HPCMP CREATE™-MG Capstone** M. Williamschen, E. Mestreau, R. Aubry, S. Dey, W. Szymczak, Naval Research Laboratory, Washington, D.C.	1530 hrs AIAA-2020-1406 **Automatic Multigrid Generation for an Unstructured Parallel Overset-Grid Solver** L. Chang, A. Rigo, N. Pérez-Arancibia, University of Southern California, Los Angeles, CA	1600 hrs AIAA-2020-1407 **Dual-Grid Interpolation for Cell-Centered Overset Grid Systems** R. Noack, Celeritas Simulation Technology, LLC, Sarasota, FL; N. Wyman, Pointwise, Inc., Fort Worth, FL; G. McGowan, C. Brown, Corvid Technologies, Inc., Mooresville, NC	1630 hrs AIAA-2020-1408 **Implementation of a Size Field Based Isotropic Hex Core Meshing Algorithm** J. Steinbrenner, N. Wyman, M. Jefferies, S. Karman, Pointwise, Inc., Fort Worth, TX; J. Shipman, Combustion Research and Flow Technology, Inc., Pipersville, PA		

Wednesday, 8 January 2020						
372-NDA-10/MDO-15	**Physics-Informed Machine Learning: Methods and Applications II**					**Celebration 3**
Chaired by: N. SOMANATH, Pratt & Whitney and Y. ZHANG, GE Research						
1430 hrs AIAA-2020-1409 **Enhancement of Low Fidelity Fluid Simulations using Machine Learning** K. Fuchi, University of Dayton, Dayton, OH; E. Wolf, Ohio Aerospace Institute, Dayton, OH; D. Makhija, Lateral Unbounded Software, LLC, Dayton, OH; N. Wukie, C. Schrock, P. Beran, Air Force Research Laboratory, Wright-Patterson AFB, OH	1500 hrs AIAA-2020-1410 **Flyer Plate Continuum Simulations Informed with Machine Learning Crack Evolution** M. Fernandez-Godino, N. Panda, D. O'Malley, K. Hickmann, D. Oyen, Los Alamos National Laboratory, Los Alamos, NM; R. Haftka, University of Florida, Gainesville, Gainesville, FL; et al.	1530 hrs AIAA-2020-1411 **Physics-based data-driven reduced-order models for a single-injector combustion process** R. Swischuk, B. Kramer, Massachusetts Institute of Technology, Cambridge, MA; C. Huang, University of Michigan, Ann Arbor, Ann Arbor, MI; K. Willcox, University of Texas, Austin, Austin, TX	1600 hrs AIAA-2020-1412 **A hybrid model for main bearing fatigue prognosis based on physics and machine learning** Y. Yucesan, F. Viana, University of Central Florida, Orlando, FL	1630 hrs AIAA-2020-1413 **Probabilistic Aircraft Trajectory Prediction Considering Weather Uncertainties Using Dropout As Bayesian Approximate Variational Inference** Y. Pang, Y. Liu, Arizona State University, Tempe, AZ	1700 hrs AIAA-2020-1414 **Correlation Effects in Bayesian Neural Networks for Computational Aeroacoustics Ice Detection** J. Hauth, X. Huan, University of Michigan, Ann Arbor, Ann Arbor, MI; B. Zhou, N. Gauger, Technical University of Kaiserslautern, Kaiserslautern, Germany; M. Morelli, A. Guardone, Technical University of Milan, Milan, Italy	

Wednesday, 8 January 2020						
373-NDA-11	**Uncertainty Quantification and Management I**					**Celebration 2**
Chaired by: Y. LIU, Arizona State University and S. MULANI, The University of Alabama						
1430 hrs AIAA-2020-1415 **Propagating and Combining Aleatory Uncertainties characterized by Continuous Random Variables and Sparse Discrete Realizations from Random Functions** V. Romero, Sandia National Laboratories, Albuquerque, NM	1500 hrs AIAA-2020-1416 **Uncertainty Quantification across Design Space using Spatially Accurate Polynomial Chaos** J. Schaefer, A. Cary, M. Mani, The Boeing Company, Hazelwood, MO; T. Grandine, The Boeing Company, Tukwila, WA	1530 hrs AIAA-2020-1417 **Synthesis of Discrete Distributed, Correlated Multivariates Utilizing Walsh Functions for Uncertainty Quantification** E. Forster, P. Beran, R. Kolonay, Air Force Research Laboratory, Wright-Patterson AFB, OH; H. Bae, Wright State University, Dayton, OH	1600 hrs AIAA-2020-1418 **Adaptive sparse grid approximation for high dimensional interval field construction** M. Faes, D. Moens, Catholic University of Leuven, Leuven, Belgium	1630 hrs AIAA-2020-1419 **Uncertainty Management for the Stochastic Response of Uncertain Linear Structures Modeled in Finite Elements** P. Song, X. Wang, M. Mignolet, Arizona State University, Tempe, AZ		

Wednesday, 8 January 2020						
374-PC-17	**Combustion - Jet in Crossflow**					**Bayhill 26**
Chaired by: S. CHAUDHURI, University of Toronto and M. HARVAZINSKI, AFRL/RQRC						
1430 hrs AIAA-2020-1420 **Tomographic PIV Characterization of the Near field Topology of the Reacting Jet in Crossflow** V. Nair, M. Sirignano, S. Schmidheiser, L. Dillon, Georgia Institute of Technology, Atlanta, GA; C. Fugger, T. Yi, Spectral Energies, LLC, Dayton, OH; et al.	1500 hrs AIAA-2020-1421 **Investigation of Pressure Effects on Reacting Jet in Vitiated Crossflow** M. Otero, T. Genova, J. Reyes, K. Ahmed, University of Central Florida, Orlando, FL; S. Martin, Embry-Riddle Aeronautical University, Daytona Beach, FL; C. Velez, General Electric Company, Schenectady, NY	1530 hrs AIAA-2020-1422 **High-Pressure Reacting Characteristics of Axial Stage Combustion** T. Genova, M. Otero, J. Reyes, K. Ahmed, University of Central Florida, Orlando, FL; S. Martin, Embry-Riddle Aeronautical University, Daytona Beach, FL; C. Velez, General Electric Company, Niskayuna, NY	1600 hrs AIAA-2020-1423 **Interactions between a Jet and an Oscillating Transverse Flow** C. Hilliker, S. Wagner, T. Krizak, D. Mataya, L. Manke, D. Forliti, University of St. Thomas, St. Paul, MN			

Wednesday, 8 January 2020

375-PC-18	Rocket Combustion II					Manatee Spring II
Chaired by: E. BARBOUR, The Aerospace Corpation and C. DENNIS, Naval Air Warfare Center						
1430 hrs AIAA-2020-1424 **Modeling Aluminum Combustion in Oxidizing Environment with the Gibbs Formulation** K. Lee, University of Florida, Gainesville, Gainesville, FL	1500 hrs AIAA-2020-1425 **Burning Rate Characterization of Ammonium Perchlorate Pellets Containing Nano-Catalytic Additives** F. Rodriguez, J. Thomas, D. Teitge, E. Petersen, Texas A&M University, College Station, TX	1530 hrs AIAA-2020-1427 **Investigation of Additively Manufactured Layered Composite Solid Propellant** M. McClain, A. Afriat, J. Rhoads, Purdue University, West Lafayette, IN; I. Gunduz, Naval Postgraduate School, Monterey, CA; S. Son, Purdue University, West Lafayette, IN	1600 hrs AIAA-2020-1428 **Measurement and Modeling of Fuel Rich Kerosene Soot Deposit** R. Kulakhmetov, T. Pourpoint, Purdue University, West Lafayette, IN	1630 hrs AIAA-2020-1429 **Strand Burner Experiments with Metal-Loaded AP/HTPB Laminate Propellants** J. Thomas, F. Rodriguez, E. Petersen, Texas A&M University, College Station, TX		

Wednesday, 8 January 2020

376-PDL-9	Short Pulsed Lasers Discussion Group (Invited)				Bayhill 32
Chaired by: C. LIMBACH, Texas A&M University					
1430 hrs Oral Presentation **Development of Short-Pulse Laser Diagnostics for High-Speed Flows: Current Applications and Future Prospects** T. Meyer, M. Slipchenko, M. Smyser, J. Fisher, K. Rahman, V. Athmanathan, Purdue University, West Lafayette, IN; et al.	1500 hrs Oral Presentation **Dynamics of Plasma Induced by Dual-Pulse Laser** A. Tropina, R. Miles, Texas A&M University, College Station, TX; M. Shneider, Princeton University, Princeton, NJ	1530 hrs Oral Presentation **Numerical Simulation of Laser Plasma Interaction: Nanosecond Pulse** M. Panesi, A. Munafò, A. Alberti, University of Illinois, Urbana-Champaign, Urbana, IL	1600 hrs Oral Presentation **Ultrafast nonlinear optics for diagnostics in air** A. Dogariu, Princeton University, Princeton, NJ	1630 hrs **Short-Pulsed Lasers Discussion**	

Wednesday, 8 January 2020

378-PGC-8/PC-19 1430 - 1730 hrs	Challenges and Opportunities for Pressure Gain Combustion	Manatee Spring I

This panel will discuss current challenges and opportunities associated with operating pressure gain combustion devices such as rotating detonation engines in rockets, aeronautical gas turbines, power generation gas turbines, and high-speed air breathing propulsion.

Panelists:

S. Alex Schumaker Air Force Research Laboratory	**Don Ferguson** Department of Energy	**Chris Brophy** Naval Postgraduate School	**Scott Claflin** Aerojet Rocketdyne	**Dan Paxson** NASA Glenn Research Center
Doug Schwer Naval Research	**Venke Sankaran** Air Force Research Laboratory	**Chiping Li** Air Force Office of Scientific Research	**Jackson Crane** Stanford University	

Wednesday, 8 January 2020						
379-SATS-2	**Small Satellites Orbital Operations**					**Plaza Ballroom I**
Chaired by: J. STRAUB, North Dakota State University						
1430 hrs AIAA-2020-1432 **Simulating the Dynamics and Control of a Free-Flying Small Satellite with a Robotic Manipulator for 3D Printing** R. Spicer, J. Black, Virginia Polytechnic Institute and State University, Blacksburg, VA	1500 hrs AIAA-2020-1433 **Model Predictive Approach for Detumbling an Underactuated Satellite** K. Kondo, Y. Yoshimura, M. Bando, S. Nagasaki, T. Hanada, Kyushu University, Fukuoka, Japan	1530 hrs AIAA-2020-1434 **On-orbit Separation and Semi-Hard Landing Mechanism of Nano Moon Lander OMOTENASHI** J. Kikuchi, T. Hashimoto, M. Otsuki, N. Morishita, W. Torii, Japan Aerospace Exploration Agency (JAXA), Sagamihara, Japan; T. Kuhara, Technosolver Corporation, Fujisawa, Japan; et al.	1600 hrs AIAA-2020-1435 **Minimum Jerk Attitude Slew Maneuvers** A. Thompson, Raytheon Company, Aurora, CO			

Wednesday, 8 January 2020						
380-SCS-6	**Spacecraft Booms and Trusses and Testing of Lightweight Spacecraft Structures II**					**Celebration 12**
Chaired by: M. SANTER, Imperial College London and H. FANG						
1430 hrs AIAA-2020-1436 **Transition region stress concentrations in clamped tape springs** J. Shore, A. Viquerat, University of Surrey, Guildford, United Kingdom; G. Richardson, Surrey Satellite Technology, Ltd., Guildford, United Kingdom; G. Aglietti, University of Surrey, Guildford, United Kingdom	1500 hrs AIAA-2020-1437 **Buckling of Ultralight Ladder-type Coilable Space Structures** F. Royer, S. Pellegrino, California Institute of Technology, Pasadena, CA	1530 hrs AIAA-2020-1438 **Nonlinear analysis of composite tape springs by refined beam models** E. Carrera, A. Pagani, A. Garcia de Miguel, Technical University of Turin, Turin, Italy	1600 hrs AIAA-2020-1439 **Thermal response of CFRP deployable tubes in the space environment** G. De Zanet, A. Viquerat, University of Surrey, Guildford, United Kingdom	1630 hrs AIAA-2020-1440 **Gravity Off-Load Follower (GOLF) Cart System for Ground-Based Spacecraft Testing** A. Fratian, Applied Technology Associates, Albuquerque, NM; S. Jeon, Lincoln Laboratory, Massachusetts Institute of Technology, Lexington, MA; K. Cheung, Cornell University, Ithaca, NY; J. Griffee, LoadPath, LLC, Albuquerque, NM; B. Urioste, C. Box, Air Force Research Laboratory, Kirtland AFB, NM		

Wednesday, 8 January 2020						
381-SD-11	**Structural Dynamic Testing and Correlation Methods**					**Celebration 15**
Chaired by: H. KIM, Boeing Defense, Space & Security and R. MALLA, University of Connecticut						
1430 hrs AIAA-2020-1441 **Design of a New Experimental Facility to Investigate the Vibratory Characteristics of Bladed Disks at Operational Speed** K. D'Souza, E. Kurstak, K. Ruff, M. Dunn, Ohio State University, Columbus, OH	1500 hrs AIAA-2020-1442 **Experimental Investigation of Mistuning and Damping Characteristics of a Bladed Disk at Operational Speed under Synchronous Vibration** E. Kurstak, K. D'Souza, Ohio State University, Columbus, OH	1530 hrs AIAA-2020-1443 **Modal Propellant Gauging: Spectral Density Method** K. Crosby, Carthage College, Kenosha, WI; R. Werlink, NASA Kennedy Space Center, Cape Canaveral, FL; E. Hurlbert, NASA Johnson Space Center, Houston, TX	1600 hrs AIAA-2020-1444 **Challenges of coupling effective masses and shaker models for virtual shaker testing** G. Coppotelli, D. Mastrodicasa, University of Rome "La Sapienza", Rome, Italy; S. Waimer, E. Di Lorenzo, B. Peeters, U. Musella, Siemens, Leuven, Belgium; et al.	1630 hrs AIAA-2020-1445 **Reduction method based structural model updating method via neural networks** H. Sung, Seoul National University, Seoul, South Korea; S. Chang, Kumoh National Institute of Technology, Gyeongsangbuk, South Korea; M. Cho, Seoul National University, Seoul, South Korea		

Wednesday, 8 January 2020						
382-SD-12	**Numerical Techniques for Fluid-Structure Interaction**					**Celebration 1**
Chaired by: W. SILVA, NASA-Langley Research Center and A. DATTA, University of Maryland, College Park						
1430 hrs AIAA-2020-1446 **Methodology for Numerically Stabilizing a Harmonic Balance Based Aeroelastic Solution Approach** J. Thomas, E. Dowell, Duke University, Durham, NC	1500 hrs AIAA-2020-1447 **Student Competition: Aeroelastic Non-probabilistic Interval Process Analysis** T. Lyman, N. Urieva, L. Montes Lucano, Z. Sotoudeh, California State Polytechnic University, Pomona, CA	1530 hrs AIAA-2020-1448 **A Low-Order Frequency-Based Exploration of Vibration Localization with Engine-Order Excitation** A. Rodriguez, J. Kauffman, University of Central Florida, Orlando, FL	1600 hrs AIAA-2020-1449 **Development and Validation of a High-Fidelity Aero-Thermo-Elastic Analysis Capability** S. Kamali, D. Mavriplis, E. Anderson, University of Wyoming, Laramie, Laramie, WY	1630 hrs AIAA-2020-1450 **Correlation Studies of Geometrically Nonlinear Aeroelastic Formulations with Beam and Shell Elements** Y. Huang, University of Alabama, Tuscaloosa, Tuscaloosa, AL; N. Tsushima, H. Arizono, Japan Aerospace Exploration Agency (JAXA), Tokyo, Japan; T. Yokozeki, University of Tokyo, Tokyo, Japan; W. Su, University of Alabama, Tuscaloosa, Tuscaloosa, AL	1700 hrs AIAA-2020-1451 **Sloshing ROMs for Fluid-Structure Interactions in Aerospace Applications** F. Mastroddi, F. Saltari, A. Traini, A. Barile, University of Rome "La Sapienza", Rome, Italy; F. Gambioli, Airbus, Filton, United Kingdom	

Wednesday, 8 January 2020						
383-SEN-4	**Fusion Architectures and Sensor Resource Management**					**Celebration 8**
Chaired by: K. ENGEBRETSON, Lockheed Martin						
1430 hrs AIAA-2020-1452 **Open Mission Systems Design Considerations for Optimal Fusion Performance** T. Frey, K. Engebretson, D. Faulk, Lockheed Martin Corporation, Fort Worth, TX	1500 hrs AIAA-2020-1453 **Integrated Aircraft Risk Analysis Framework for Health Monitoring Systems – A Case Study for Structural Health Monitoring** D. Steinweg, M. Hornung, Bauhaus Luftfahrt e.V., Taufkirchen, Germany	1530 hrs AIAA-2020-1454 **Enhancing Detection and Tracking Performance Using Sensor-specific Flight Trajectory Generation for UAVs: A Conceptual Approach** M. Zwick, S. Koch, P. Stütz, University of the German Federal Armed Forces, Munich, Germany	1600 hrs AIAA-2020-1455 **Air Sanitization Using AESA Radar** D. Faulk, T. Frey, Lockheed Martin Corporation, Fort Worth, TX	1630 hrs AIAA-2020-1456 **Comparison of RADAR, Passive Optical with Acoustic, and Fused Multi-Modal Active and Passive Sensing for UAS Traffic Management Compliance and Urban Air Mobility Safety** S. Siewert, M. Andalibi, S. Bruder, Embry-Riddle Aeronautical University, Prescott, AZ		

Wednesday, 8 January 2020						
384-SFM-16	**Rendezvous, Relative Motion, Proximity Missions, and Formation Flying II**					**Bayhill 27**
Chaired by: M. ROMANO						
1430 hrs AIAA-2020-1457 **CNN-Based Pose Estimation System for Close-Proximity Operations Around Uncooperative Spacecraft** L. Pasqualetto Cassinis, R. Fonod, E. Gill, Delft University of Technology, Delft, The Netherlands; I. Ahrns, Airbus, Bremen, Germany; J. Gil Fernandez, ESA, Noordwijk, The Netherlands	1500 hrs AIAA-2020-1458 **Electromagnetic, Free-Flying Mobility Relative to a Conductive Body** K. Wilson, M. Peck, Cornell University, Ithaca, NY	1530 hrs AIAA-2020-1459 **Control Strategy for Long-Term Station-Keeping on Near-Rectilinear Halo Orbits** V. Muralidharan, Purdue University, West Lafayette, IN; A. Weiss, U. Kalabic, Mitsubishi Corporation, Cambridge, MA	1600 hrs AIAA-2020-1460 **Spacecraft Formation Guidance Law using a State Transition Matrix With Gravitational, Drag and Third-Body Perturbations** Y. Chihabi, S. Ulrich, Carleton University, Ottawa, Canada	1630 hrs AIAA-2020-1461 **Sensitivity Analysis for Initial Conditions for Proximity Operations Maneuver in the Restricted Three-Body Problem** D. Conte, Embry-Riddle Aeronautical University, Prescott, AZ; D. Spencer, Pennsylvania State University, University Park, PA	1700 hrs AIAA-2020-1462 **Robust Two-Phase ZEM/ZEV Feedback Guidance for Mars Powered Descent and Landing Problem** Y. Guo, P. Wang, G. Ma, Harbin Institute of Technology, Harbin, China; B. Wie, Iowa State University, Ames, IA	

Wednesday, 8 January 2020						
385-SFM-17	**Orbital Dynamics, Perturbations, and Stability III**					**Bayhill 28**
Chaired by: J. CHRISTIAN, Rensselaer Polytechnic Institute						
1430 hrs AIAA-2020-1463 **Parallel Chebyshev Picard Method** A. Atallah, A. Bani Younes, San Diego State University, San Diego, CA	1500 hrs AIAA-2020-1464 **Transfer Trajectories Connecting the Regions near the Moon and Triangular Libration Points in the Earth-Moon System with Solar Perturbations** L. Capdevila, San Jose State University, San Jose, CA	1530 hrs AIAA-2020-1465 **Parallel Finite Element Gravity Model** A. Atallah, A. Bani Younes, San Diego State University, San Diego, CA	1600 hrs AIAA-2020-1466 **Ballistic Lunar Transfers to Near Rectilinear Halo Orbit: Operational Considerations** N. Parrish, E. Kayser, S. Udupa, J. Parker, B. Cheetham, Advanced Space, LLC, Boulder, CO; D. Davis, a.i. solutions, Inc., Houston, TX	1630 hrs AIAA-2020-1467 **Circulating, Eccentric Periodic Orbits at the Moon** S. McArdle, R. Russell, University of Texas, Austin, Austin, TX		

Wednesday, 8 January 2020

386-SFM-18 — **Space Trajectory Design and Optimization III** — **Bayhill 29**

Chaired by: E. FANTINO, Khalifa University of Science and Technology & Research

1430 hrs	1500 hrs	1530 hrs	1600 hrs	1630 hrs		
AIAA-2020-1468	AIAA-2020-1469	AIAA-2020-1470	AIAA-2020-1471	AIAA-2020-1472		
Julia Language 1.1 Ephemeris Reader and Gravitational Modeling Program for Solar System Bodies	**Augmenting Spacecraft Maneuver Strategy Optimization for Detection Avoidance With Competitive Coevolution**	**An automatic tree search algorithm for the Tisserand graph**	**Robust Space Trajectory Design using Belief Stochastic Optimal Control**	**Fuel-Optimal Guidance for End-to-End Human-Mars Entry, Powered-Descent, and Landing Mission**		
K. Martin, T. Minkoff, P. Landon, B. Gray, Embry-Riddle Aeronautical University, Prescott, AZ; D. Landau, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA	J. Reiter, D. Spencer, Pennsylvania State University, University Park, PA	D. de la Torre, Technical University of Catalonia, Barcelona, Spain; E. Fantino, Khalifa University of Science and Technology, Abu Dhabi, United Arab Emirates; R. Flores, International Center for Numerical Methods in Engineeringi, Barcelona, Spain; O. Calvente Lozano, C. García Estelrich, Technical University of Catalonia, Barcelona, Spain	C. Greco, University of Strathclyde, Glasgow, United Kingdom; S. Campagnola, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA; M. Vasile, University of Strathclyde, Glasgow, United Kingdom	C. Wan, G. Jing, R. Dai, Ohio State University, Columbus, OH; J. Rea, NASA Johnson Space Center, Houston, TX		

Wednesday, 8 January 2020

387-STR-11 — **Design, Analysis, and Certification of Additive Structures I** — **Celebration 14**

Chaired by: R. TAYLOR, University of Texas, Arlington and Z. HU, The Boeing Company

1430 hrs	1500 hrs	1530 hrs				
AIAA-2020-1473	AIAA-2020-1474	AIAA-2020-1475				
Fracture Behavior of Thin-Walled Inconel 718 Manufactured with Selective Laser Melting	**Key Elements of the Qualification, Workmanship, and Design Verification of Additively Manufactured Parts**	**Distortion Prediction of Ti6Al4V Parts in Selective Laser Melting: An Industrial Case Study**				
F. Golinveaux, University of California, Los Angeles, Los Angeles, CA; C. Lynch, University of California, Riverside, Riverside, CA; C. Sagrillo, The Aerospace Corporation, El Segundo, CA; K. Rivera, University of California, Los Angeles, Los Angeles, CA; J. Rome, T. McLouth, The Aerospace Corporation, El Segundo, CA; et al.	J. Rome, B. Soltz, V. Goyal, The Aerospace Corporation, El Segundo, CA	V. Savane, Dassault Group, Pune, India; R. Fu, Dassault Group, Bellevue, WA; P. Gagorik, Morf3D Aerospace, El Segundo, CA; C. Chin, Dassault Group, Bellevue, WA				

Wednesday, 8 January 2020

388-STR-12 — **NASA Advanced Composites Project - Advances in Composite Design Tools** — **Celebration 5**

Chaired by: S. ENGELSTAD, Lockheed Martin Aeronautics and S. WANTHAL, Boeing Research & Technology

1430 hrs	1500 hrs	1530 hrs	1600 hrs	1630 hrs	1700 hrs	
AIAA-2020-1476	AIAA-2020-1477	AIAA-2020-1478	AIAA-2020-1479	AIAA-2020-1480	AIAA-2020-1481	
Evaluation of BSAM (B-Spline Analysis Method) for Residual Strength and Life Prediction Using Three-Point Bend Doubler Under Quasi-Static and Cyclic Loading	**Design for Manufacturing Tool for Automated Fiber Placement Structures – Verification and Validation**	**Unified Analysis of Aerospace Structures through Implementation of Rapid Tools into a Stress Framework**	**Progressive Damage Analysis of Post-buckled Stiffened Panels under Static Compressive Loading**	**Testing of a Multi-Stringer Post-Buckled Panel**	**Progressive Damage Analysis of a Multi-Stringer Post-Buckled Panel**	
A. Selvarathinam, Lockheed Martin Corporation, Fort Worth, TX; S. Perera, G. Smith, Wichita State University, Wichita, TX; J. Schaefer, The Boeing Company, St. Louis, MO; W. Johnston, W. Jackson, NASA Langley Research Center, Hampton, VA; et al.	A. Noevere, C. Collier, Collier Research Corporation, Newport News, VA	C. Collier, S. Jones, Collier Research Corporation, Newport News, VA	F. Leone, NASA Langley Research Center, Hampton, VA; K. Song, Analytical Mechanics Associates, Inc., Hampton, VA; C. Rose, W. Jackson, NASA Langley Research Center, Hampton, VA	J. Action, Lockheed Martin Corporation, Marietta, GA; U. Palliyaguru, Wichita State University, Wichita, KS	J. Action, Lockheed Martin Corporation, Marietta, GA; F. Leone, NASA Langley Research Center, Hampton, VA; N. Vieira De Carvalho, National Institute of Aerospace, Hampton, VA	

Wednesday, 8 January 2020

389-TF-5 — **Rolling Recap of Electric Aircraft Papers from the 2019 AIAA AVIATION and Propulsion and Energy Forums, and the Electronic Aircraft Technologies Symposium (EATS) 2019** — **Bayhill 25**

1430 - 1630 hrs

Wednesday, 8 January 2020

390-TP-9 — **Emerging Tech in Thermophysics: Applied Additive Manufacturing** — **Florida Ballroom A**

Chaired by: J. RABINOVITCH, Jet Propulsion Laboratory and W. TSAI, California State University, Maritime Academy

1430 hrs	1500 hrs	1530 hrs	1600 hrs	1630 hrs	1700 hrs
AIAA-2020-1482	Oral Presentation	Oral Presentation	Oral Presentation	Oral Presentation	Oral Presentation
Additive Manufacturing Applications in Heat Exchangers, Radiators and Heaters	**Additively Manufactured Thermal Control Systems at JPL**	**Thermal Influences in the Design of Printed Satellite Structures and Component**	**Technology Development for the Archinaut One In-Space Manufacturing Demonstration**	**Thermal Radiation on Satellites Enabled by the Use of 3D Printed Structures**	**Big Area Additive Bio-Manufacturing and High Volume Renewable Composite Feedstocks**
K. Weed, D. Waller, B. Brown, C. Leone, M. Musselman, Ball Corporation, Westminster, CO	B. Furst, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA	D. Doyle, Air Force Research Laboratory, Kirtland AFB, NM	J. Kugler, Made in Space, Inc., Jacksonville, FL	A. Kwas, Northrop Grumman Corporation, Albuquerque, NM	S. Ozcan, Oak Ridge National Laboratory, Oak Ridge, TN

Wednesday, 8 January 2020

391-UAS-6 — **UAS Guidance, Navigation, and Control III** — **Celebration 16**

Chaired by: Z. MIAN, Alphabet/Google - Loon

1430 hrs	1500 hrs	1530 hrs	1600 hrs	1630 hrs	1700 hrs
AIAA-2020-1483	AIAA-2020-1484	AIAA-2020-1485	AIAA-2020-1486	AIAA-2020-1487	AIAA-2020-1488
Operational Considerations of Small UAS in Urban Canyons	**Model Predictive Control of Autonomous Drone Considering Model of Birds Aimed at Inducing a Flock of Birds**	**Artificial Neural Network-Based Flight Control Using Distributed Sensors on Fixed-Wing Unmanned Aerial Vehicles**	**Toward Autonomous In-flight Docking of Unmanned Multi-rotor Aerial Vehicles**	**Simulation Environment for Development of Algorithms for Autonomous Soaring**	**Autonomous Autorotation of Tilt Rotor Aircraft Using Nonlinear Model Predictive Control**
M. Logan, NASA Langley Research Center, Hampton, VA; E. Bird, L. Hernandez, M. Menard, Texas A&M University, Corpus Christi, TX	S. Hamabe, M. Takahashi, Keio University, Yokohama, Japan	S. Araujo-Estrada, S. Windsor, University of Bristol, Bristol, United Kingdom	R. Rocha, S. Robinson, University of California, Davis, Davis, CA	J. Rosales, A. Gross, New Mexico State University, Las Cruces, NM	E. Wilson, R. Prazenica, Embry-Riddle Aeronautical University, Daytona Beach, FL

Wednesday, 8 January 2020

392-WE-7 — **Unsteady Aerodynamics and Aeroelasticity** — **Plaza Ballroom D**

Chaired by: C. VAN DAM, University of California-Davis and B. HOUCHENS, Sandia National Laboratories

1430 hrs	1500 hrs	1530 hrs	1600 hrs
AIAA-2020-1489	AIAA-2020-1490	AIAA-2020-1491	AIAA-2020-1492
Analysis of Interactional Aerodynamics in Multi-Rotor Wind Turbines using Large Eddy Simulations	**New Methodology to Study Unsteady Wind on Aerodynamic Performance of Vertical Axis Wind Turbines**	**Wind Energy Generation by Dynamic Stall**	**Towards Efficient 2-DOF LCO Control Using a Closed-loop Nonlinear Active Flow Control Technique**
U. Hebbar, J. Rane, F. Gandhi, O. Sahni, Rensselaer Polytechnic Institute, Troy, NY	M. Jafari, Iowa State University, Ames, IA; A. Razavi, Dunwoody College of Technology, Minneapolis, MN; M. Hassanalian, New Mexico Institute of Mining and Technology, Socorro, NM	D. Keisar, Technion–Israel Institute of Technology, Haifa, Israel; T. De Troyer, Vrije Universiteit Brussel, Brussels, Belgium; D. Greenblatt, Technion–Israel Institute of Technology, Haifa, Israel	W. MacKunis, V. Golubev, K. Kidambi, R. Mankbadi, Embry-Riddle Aeronautical University, Daytona Beach, FL; O. Stalnov, Technion–Israel Institute of Technology, Haifa, Israel

Wednesday, 8 January 2020

393-HUB-11 — **AIAA Public Policy Tweetup in the HUB!** — **the HUB**

1500 - 1600 hrs

Spreading the word about AIAA public policy activities and Congressional Visits Day on social media.

Wednesday, 8 January 2020

394-NW-13 — **Wednesday Afternoon Networking Coffee Break** — **Exposition Hall**

1530 - 1600 hrs

Wednesday, 8 January 2020

395-PLNRY-4 — **Special Session: Engineering Apollo: Flight Simulation** — **Windermere Ballroom**

1630 - 1800 hrs

Moderator: John Tylko, Chief Innovation Officer, Aurora Flight Sciences

Panelists:

Frank Hughes
President, Tietronix; and
Chief, Space Flight Training, NASA (ret.)

Wayne Ottinger
President, Aerospace Legacy Engineering & Technology Recovery Organization; and
Lunar Landing Training Vehicle Technical Director and Base Manager, NASA (ret.)

Col. David R. Scott
USAF (ret.)
NASA Astronaut on Gemini VIII, Apollo 9, and Apollo 15

Wednesday, 8 January 2020		
396-LEC-1 1800 - 1900 hrs	**Dryden Lecture in Research**	Regency Ballroom Q
Evolution of Optimization, Experiments, and Uncertainty Quantification with Increasing Computing Power **Raphael T. Haftka** University of Florida		

Wednesday, 8 January 2020		
397-STR-20/SD-13/MAT-17 1800 - 1900 hrs	**Structures, Structural Dynamics, and Materials Lecture**	Plaza Ballroom H
Larry Ilcewicz Federal Aviation Administration		

Thursday

Thursday, 9 January 2020		
398-SB-4 0730 - 0800 hrs	**Thursday Speaker Briefing**	Session Rooms

Thursday, 9 January 2020		
399-PLNRY-5 0800 - 0900 hrs	**Engineers Build the World**	Windermere Ballroom
Moderator: Laurette Lahey, Director, Flight and Vehicle Technology, Boeing Research & Technology **Lori Garver** Chief Executive Officer Earthrise Alliance		

Thursday, 9 January 2020		
400-HUB-12 0900 - 1000 hrs	**Extended Q&A With Lori Garver**	the HUB
Didn't get your question answered during the Thursday morning plenary? Come to the HUB to hear Lori Garver, Chief Executive Officer, Earthrise Alliance, continue the conversation on how "Engineers Build the World".		

Thursday, 9 January 2020		
401-NW-14 0900 - 0930 hrs	**Thursday Morning Networking Coffee Break**	Exposition Hall

Thursday, 9 January 2020						
402-AA-8	**Propeller/UAV Sound**					Peacock Spring
Chaired by: N. MURRAY, The University of Mississippi and W. ALEXANDER, Virginia Tech						
0930 hrs AIAA-2020-1493 **Simulations of Broadband Noise of a Small UAV Propeller** R. Mankbadi, S. Afari, V. Golubev, Embry-Riddle Aeronautical University, Daytona Beach, FL	1000 hrs AIAA-2020-1494 **Controller Design for Propeller Phase Synchronization with Aeroacoustic Performance Metrics** A. Patterson, University of Illinois, Urbana-Champaign, Urbana, IL; N. Schiller, NASA Langley Research Center, Hampton, VA; K. Ackerman, A. Gahlawat, University of Illinois, Urbana-Champaign, Urbana, IL; I. Gregory, NASA Langley Research Center, Hampton, VA; N. Hovakimyan, University of Illinois, Urbana-Champaign, Urbana, IL	1030 hrs AIAA-2020-1495 **A Numerical Study of Sound Generation on Pitch and Plunge Wing at Low Reynolds Numbers** H. Aono, K. Kikkawa, H. Ishikawa, Tokyo University of Science, Tokyo, Japan; C. Kang, University of Alabama, Huntsville, Huntsville, AL	1100 hrs AIAA-2020-1496 **Acoustic Optimization for Anti-Phase Asymmetric Rotor** J. Xiong, Stinger Ghaffarian Technologies, Inc., Moffett Field, CA; N. Nguyen, N. Cramer, NASA Ames Research Center, Moffett Field, CA	1130 hrs AIAA-2020-1497 **Design and Development of a Small-Scale Coaxial Rotor for Aeroacoustic Investigation** K. Munz, V. Raghav, Auburn University, Auburn, AL		

Thursday, 9 January 2020						
403-ACD-14/TF-6	**Hybrid-Electric, Electric, and Alternative Propulsion Studies**					**Orlando Ballroom L**
Chaired by: P. RAJ, Virginia Tech and A. DORSEY, Boeing Advanced Concepts						
0930 hrs AIAA-2020-1498 **Feasibility Study of a Liquefied Natural Gas Fuel-Cooled Small Scale Hybrid Electric Flight Vehicle** J. Hartwig, NASA Glenn Research Center, Cleveland, OH; B. Niezgoda, Carnegie Mellon University, Pittsburgh, PA; L. Kohlman, NASA Ames Research Center, Moffett Field, CA	1000 hrs AIAA-2020-1499 **The Feasibility of Electric Propulsion for Commuter Aircraft** M. Kruger, A. Uranga, University of Southern California, Los Angeles, CA	1030 hrs AIAA-2020-1500 **Feasibility of a Solid Oxide Fuel Cell System Applied to Hybrid-Electric Regional Aircraft** S. Geuther, F. Capristan, NASA Langley Research Center, Hampton, VA	1100 hrs AIAA-2020-1501 **An Integrated Design Framework for Aircraft with Hybrid Electric Propulsion** B. Aigner, E. Stumpf, A. Hinz, R. De Doncker, RWTH Aachen University, Aachen, Germany	1130 hrs AIAA-2020-1502 **Comparative Assessment of Parallel-Hybrid-Electric Propulsion Systems for Four Different Aircraft** D. Finger, C. Braun, Aachen University of Applied Sciences, Aachen, Germany; C. Bil, RMIT University, Melbourne, Australia	1200 hrs AIAA-2020-1503 **Conceptual Design of a Thin-Haul Aircraft by Energy Sizing Optimization Including Aero-Propulsive Interactions** H. Silva, T. Guimarães, Federal University of Uberlândia, Uberlândia, Brazil	

Thursday, 9 January 2020						
404-AFM-14	**Flight Dynamics of Multirotor Vehicles**					**Bayhill 20**
Chaired by: T. FIELDS, University of Missouri-Kansas City and A. L'AFFLITTO, Virginia Polytechnic Institute and State University						
0930 hrs AIAA-2020-1504 **Recent NASA Wind Tunnel Free-Flight Testing Of A Multirotor Unmanned Aircraft System** J. Foster, L. Miller, R. Busan, S. Langston, NASA Langley Research Center, Hampton, VA; D. Hartman, Drexel University, Philadelphia, PA	1000 hrs AIAA-2020-1505 **Multibody model of a large multicopter with arbitrary propeller axes of rotation** M. Friedrich, W. Fichter, University of Stuttgart, Stuttgart, Germany	1030 hrs AIAA-2020-1506 **Expanding the Mission Capabilities of a Quadrotor Biplane Tail-sitter with Morphing Winglets** P. Ryseck, D. Yeo, V. Hrishikeshavan, I. Chopra, University of Maryland, College Park, College Park, MD	1100 hrs AIAA-2020-1507 **Toward Developing MTEs for Multirotor sUAS in Controlled Wind Conditions** A. Lampton, D. Klyde, T. Prince, T. Swaney, Systems Technology, Inc., Hawthorne, CA; C. Belcastro, NASA Langley Research Center, Hampton, VA	1130 hrs AIAA-2020-1508 **Interactions Between Upstream Turbulent Flow and Quadrotor Thruster Dynamic Performance** N. Wang, D. DiDominic, T. Vartabedian, A. Sanyal, M. Glauser, Syracuse University, Syracuse, NY		

Thursday, 9 January 2020						
405-AFM-15	**Mars Human Entry, Descent and Landing Systems**					**Bayhill 19**
Chaired by: A. DWYER-CIANCIOLO, NASA Langley Research Center and B. JOHNSON, NASA Johnson Space Center						
0930 hrs AIAA-2020-1509 **Human Mars Entry, Descent, and Landing Architecture Study: Phase 3 Summary** A. Dwyer-Cianciolo, NASA Langley Research Center, Hampton, VA; T. Polsgrove, NASA Marshall Space Flight Center, Huntsville, AL; R. Sostaric, NASA Johnson Space Center, Houston, TX; K. Edquist, A. Korzun, NASA Langley Research Center, Hampton, VA; J. Garcia, NASA Ames Research Center, Moffett Field, CA	1000 hrs AIAA-2020-1510 **Powered Descent Aerodynamics for Low and Mid Lift-to-Drag Human Mars Entry, Descent and Landing Vehicles** A. Korzun, NASA Langley Research Center, Hampton, VA; C. Tang, Y. Rizk, NASA Ames Research Center, Moffett Field, CA; F. Canabal, NASA Marshall Space Flight Center, Huntsville, AL; R. Childs, Science and Technology Corporation, Moffett Field, CA; J. Van Norman, Analytical Mechanics Associates, Inc., Hampton, VA; et al.	1030 hrs AIAA-2020-1511 **Structural Mass Optimization with Manifest Packaging, and Outer Mold Line Updates of a Rigid Mid Lift-to-Drag Mars Entry Lander Vehicle** D. Calderon, R. Sostaric, NASA Johnson Space Center, Houston, TX; J. Garcia, J. Bowles, NASA Ames Research Center, Moffett Field, CA; C. Gaytan, H. Newton, NASA Johnson Space Center, Houston, TX; et al.	1100 hrs AIAA-2020-1512 **Parametric Trade Study of Mid Lift/Drag Entry Systems for Human Mars Mission** J. Samareh, NASA Langley Research Center, Hampton, VA	1130 hrs AIAA-2020-1513 **Mid Lift-to-Drag Rigid Vehicle 6-DoF Performance for Human Mars Entry, Descent, and Landing: A Fractional Polynomial Powered Descent Guidance Approach** B. Johnson, NASA Johnson Space Center, Houston, TX; P. Lu, San Diego State University, San Diego, CA; R. Sostaric, NASA Johnson Space Center, Houston, TX	1200 hrs AIAA-2020-1514 **Parametric Cost Estimates of Four 20 Ton Payload Mars EDL Vehicle Concepts** P. Friz, NASA Langley Research Center, Hampton, VA	

Thursday, 9 January 2020						
406-AMT-14	**Novel Aerodynamic Measurement Techniques I**					**Bayhill 22**
Chaired by: N. PARZIALE, Stevens Institute of Technology and R. PITZ, Vanderbilt University						
0930 hrs AIAA-2020-1515 **A Novel Multi-band Plenoptic Pyrometer used for Temperature Measurements of Strand Burner Plumes** D. Kelly, M. Phillips, B. Thurow, D. Scarborough, Auburn University, Auburn, AL	1000 hrs AIAA-2020-1516 **Influence of Mie and Geometric Scattering Contributions on Temperature and Density Measurements in Filtered Rayleigh Scattering** M. Boyda, G. Byun, A. Saltzman, T. Lowe, Virginia Polytechnic Institute and State University, Blacksburg, VA	1030 hrs AIAA-2020-1517 **Slow Light Imaging Spectroscopy** R. Miles, Texas A&M University, College Station, TX; A. Dogariu, Princeton University, Princeton, NJ	1100 hrs AIAA-2020-1518 **Preliminary Development of a Single Camera Rotating Volumetric Velocimetry Technique** A. Gururaj, M. Moaven, Z. Tan, B. Thurow, V. Raghav, Auburn University, Auburn, AL	1130 hrs AIAA-2020-1519 **Trip Comparison for Tailoring Transition in Reynolds-Scaled Experiments** J. Gray, J. Lakkis, R. Aliakbari, D. Vasiljev, A. Pastore-Rodriguez, C. Purser, RMIT University, Melbourne, Australia; et al.		

Thursday, 9 January 2020

407-APA-30	Aerodynamic Design and Analysis II					Barrel Spring I
Chaired by: P. JOHNSON, Boeing Commercial Airplanes and B. MCGRATH, The Johns Hopkins University Applied Physics Laboratory						
0930 hrs AIAA-2020-1520 **Approaches for Quantifying Uncertainties in Computational Modeling for Aerospace Applications** J. Schaefer, The Boeing Company, St. Louis, MO; V. Romero, Sandia National Laboratories, Albuquerque, NM; S. Schafer, Textron Aviation, Wichita, KS; B. Leyde, SmartUQ, Madison, WI; C. Denham, Virginia Polytechnic Institute and State University, Blacksburg, VA	1000 hrs AIAA-2020-1521 **Uncertainty Quantification for Launch Vehicle Aerodynamic Lineloads** T. Wignall, NASA Langley Research Center, Hampton, VA; H. Houlden, ViGYAN, Inc., Hampton, VA	1030 hrs AIAA-2020-1522 **Impact of Droop and Scarf on the Aerodynamic Performance of Compact Aero-Engine Nacelles** F. Tejero , D. MacManus, Cranfield University, Cranfield, United Kingdom; C. Sheaf, Rolls-Royce Group plc, Derby, United Kingdom	1100 hrs AIAA-2020-1523 **Sensitivity of Boundary Layer Ingestion Effects to Tube and Wing Airframe Design Features** J. Ahuja, D. Mavris, Georgia Institute of Technology, Atlanta, GA	1130 hrs AIAA-2020-1524 **Numerical implementation of the Power Balance Method for Boundary Layer Ingestion** N. Mutangara, L. Smith, K. Craig, University of Pretoria, Pretoria, South Africa		

Thursday, 9 January 2020

408-APA-31	Special Session: CREATE HPC Multiphysics I					Barrel Spring II
Chaired by: N. HARIHARAN, HPCMP CREATE and D. MCDANIEL, DoD HPCMP/CREATE						
0930 hrs AIAA-2020-1525 **HPCMP CREATE™-AV Kestrel New and Emerging Capabilities** D. McDaniel, CREATE Kestrel Team, Hoover, AL; T. Tuckey, CREATE Kestrel Team, Niceville, FL	1000 hrs AIAA-2020-1526 **Non-Perfect Gas Capabilities of HPCMP CREATE™-AV Kestrel v10** R. Bond, University of Tennessee, Tullahoma, Tullahoma, TN; S. Lindorfer, Arnold Engineering Development Complex, Arnold AFB, TN; T. Eymann, Air Force Research Laboratory, Wright-Patterson AFB, OH	1030 hrs AIAA-2020-1527 **Automated Meshing Enhancements in Helios v10** A. Wissink, Army Combat Capabilities Development Command Aviation & Missile Center, Moffett Field, CA; J. Sitaraman, Parallel Geometric Algorithms, LLC, Sunnyvale, CA; V. Lakshminarayan, Science and Technology Corporation, Moffett Field, CA	1100 hrs AIAA-2020-1528 **Enhancements to Overset Methods for Improved Accuracy and Solution Convergence** J. Sitaraman, Parallel Geometric Algorithms, LLC, Sunnyvale, CA; D. Jude, Science and Technology Corporation, Moffett Field, CA; M. Brazell, University of Wyoming, Laramie, Laramie, WY	1130 hrs AIAA-2020-1529 **Application of a Transition Model in NavyFOAM** H. Shan, M. Brown, A. Vargas, B. Rhee, Naval Surface Warfare Center, West Bethesda, MD	1200 hrs AIAA-2020-1530 **Current Status of the COFFE Solver within HPCMP CREATE™-AV Kestrel** K. Holst, U.S. Air Force, Arnold AFB, TN; R. Glasby, J. Erwin, D. Stefanski, University of Tennessee, Knoxville, Knoxville, TN; D. Prosser, Naval Air Systems Command, Patuxent River, MD; W. Anderson, NASA Langley Research Center, Hampton, VA; et al.	

Thursday, 9 January 2020

409-APA-32	Unsteady Aerodynamics I					Florida Ballroom C
Chaired by: J. HOWISON, The Citadel, The Military College of South Carolina and K. VANDEN, USAF						
0930 hrs AIAA-2020-1531 **Dynamic Stability Analysis of Bluff Body Re-Entry Vehicles using Varying Input Excitation** M. Robbins, A. Yantis, C. Fagley, T. Yechout, U.S. Air Force Academy, Colorado Springs, CO	1000 hrs AIAA-2020-1532 **Meandering of longitudinal wake vortices in slanted base afterbody flows** R. Ranjan, Ohio State University, Columbus, OH; J. Robinet, Arts et Métiers ParisTech, Paris, France; D. Gaitonde, Ohio State University, Columbus, OH	1030 hrs AIAA-2020-1533 **Multivariate Recurrent Neural Network Models for Scalar and Distribution Predictions in Unsteady Aerodynamics** Q. Wang, C. Cesnik, K. Fidkowski, University of Michigan, Ann Arbor, Ann Arbor, MI	1100 hrs AIAA-2020-1534 **QLPV Representation of Unsteady Aerodynamics and Stall** W. Farrell, M. Kinzel, University of Central Florida, Orlando, FL			

Thursday, 9 January 2020

410-APA-33	Flow Control Demonstrations and Applications III					Coral Spring I
Chaired by: R. KREEGER, NASA Glenn Research Center						
0930 hrs AIAA-2020-1535 **Investigating the Effect of Pulsed Jet Actuation at the Rudder Hinge Line of a Vertical Stabilizer with Phase-Locked PIV** L. Rohlfs, S. Löffler, J. Weiss, Technical University of Berlin, Berlin, Germany	1000 hrs AIAA-2020-1536 **Simplified Hybrid Laminar Flow Control for the A320 Fin - Aerodynamic and System Design, First Results** G. Schrauf, H. von Geyr, German Aerospace Center (DLR), Braunschweig, Germany	1030 hrs AIAA-2020-1537 **The Efficiency of Different Flow Control Methods on a Vertical Tail** P. Scholz, V. Singh, Technical University of Braunschweig, Braunschweig, Germany; A. Gebhardt, German Aerospace Center (DLR), Braunschweig, Germany; S. Löffler, J. Weiss, Technical University of Berlin, Berlin, Germany	1100 hrs AIAA-2020-1538 **Further Investigation of Vertical Stabilizer with Passive Flow Control Devices** Y. Ito, S. Koike, M. Murayama, Y. Ichikawa, K. Nakakita, K. Yamamoto, Japan Aerospace Exploration Agency (JAXA), Chofu, Japan; et al.			

Thursday, 9 January 2020						
411-APA-34	**Bio-Inspired Aerodynamics**					**Florida Ballroom B**
Chaired by: T. CHYCZEWSKI, Penn State Applied Research Lab						
0930 hrs AIAA-2020-1539 **Flying spiders: What is the drag acting on a spider-dragline in free-fall?** R. Courtney, Cleveland State University, Cleveland, OH; T. Stevens, Case Western Reserve University, Cleveland, OH; W. Zhang, Cleveland State University, Cleveland, OH; L. Zhao, Case Western Reserve University, Cleveland, OH	1000 hrs AIAA-2020-1540 **Aeroelastic Design and Analysis of a Bioinspired Flexible Airfoil** L. Gamble, D. Inman, University of Michigan, Ann Arbor, Ann Arbor, MI	1030 hrs AIAA-2020-1541 **Active roll control at high angles of attack via bio-inspired sliding alula** T. Linehan, K. Mohseni, J. Ferrar, University of Florida, Gainesville, Gainesville, FL	1100 hrs AIAA-2020-1542 **Effect of Target Lift Coefficient on Aerodynamic Optimization of Transonic Leading Edge Tubercles** R. Colpitts, R. Perez, P. Jansen, A. Levert-Beaulieu, Royal Military College of Canada, Kingston, Canada			

Thursday, 9 January 2020						
412-AS-5	**Design of Adaptive Aircraft and Spacecraft Structures**					**Celebration 4**
Chaired by: Y. CHEN, National Research Council of Canada, Aerospace Research Center and D. MCGOWAN, NASA Langley Research Center						
0930 hrs AIAA-2020-1543 **Design and Analysis of Self-Deployable, Self-Stiffening, and Retractable Arrays** N. Pehrson, D. Ames, S. Magleby, Brigham Young University, Provo, UT; B. Ignaut, Degrees of Freedom, LLC, Venice, CA	1000 hrs AIAA-2020-1544 **Modeling and Control of Robot-Structure Coupling During In-Space Structure Assembly** S. Swei, B. Jenett, N. Cramer, K. Cheung, NASA Ames Research Center, Moffett Field, CA	1030 hrs AIAA-2020-1545 **Deployable Tessellated Paraboloidal Surfaces with Panel Thickness Accommodation** N. Michael, B. Trease, University of Toledo, Toledo, OH	1100 hrs AIAA-2020-1546 **Combining Density-based Approach and Optimization Refinement in the Design of Morphing Airfoil Structures** Z. Zhang, C. Song, C. Yang, Beihang University, Beijing, China; V. Cavalieri, A. De Gaspari, S. Ricci, Technical University of Milan, Milan, Italy			

Thursday, 9 January 2020						
413-ASE-2	**Environments, Natural and Man-Made**					**Celebration 13**
Chaired by: D. HAN, Missouri University of Science and Technology and D. FERGUSON, Air Force Reseach Laboratory						
0930 hrs AIAA-2020-1547 **Electrodynamic Coupling Between The Atmospheric and Space Environments after an Extreme Space Weather Event** E. Bering, University of Houston, Houston, TX; M. Kokorowski, R. Holzworth, M. McCarthy, University of Washington, Seattle, Seattle, WA; R. Millan, L. Woodger, Dartmouth College, Hanover, NH; et al.	1000 hrs AIAA-2020-1548 **Photoelectron Sheath near the Lunar Surface: Fully Kinetic Modeling and Uncertainty Quantification Analysis** J. Zhao, X. Wei, Z. Hu, X. He, D. Han, Missouri University of Science and Technology, Rolla, MO; Z. Hu, University of Michigan, Dearborn, Dearborn, MI; et al.	1030 hrs AIAA-2020-1549 **Fully Kinetic PIFE-PIC Simulations of Plasma Charging at Lunar Craters** D. Lund, J. Zhao, A. Lamb, D. Han, Missouri University of Science and Technology, Rolla, MO	1100 hrs AIAA-2020-1550 **The Effects of Martian and Lunar Dust on Solar Panel Efficiency and a Proposed Solution** J. Shahmoradi, A. Maxwell, S. Little, Q. Bradfield, S. Bakhtiyarov, P. Roghanchi, New Mexico Institute of Mining and Technology, Socorro, NM; et al.			

Thursday, 9 January 2020

414-CASE-4/GT-4 0930 - 1130 hrs	Future Workforce Development in Complex Aerospace Systems	Plaza Ballroom I

AIAA is proud to present the 4th in a series of sessions aimed at understanding, sharing and creating innovative solutions to attack the growing challenges associated with maintaining a superbly qualified Aerospace RDT&E workforce. The session chairs developed a workforce development construct* that describes "human resources" as the system surrounding the people. That means individuals, organizations, and all the environmental forces affecting each must have a synergy to create successful outcomes. In this fourth session the authors intend to explore this construct and focuses on the environmental forces – what are the challenges that individuals must prepare for and continue to address across their careers? What must organizations do to evolve and change to address and incorporate the many new technologies, while continuing to meet the needs of the workforce and being successful in the market place?

Some of the topics expected to be discussed include:
- Baseline and continuing education and training
- Embracing (not just dealing with) technological change at home and in the workplace
- Human/machine (including experimental and computational) integration
- Adaptation to and thriving with changing organizational models and ways of accomplishing work
- Best practices, from the individual's perspective, to hire and retain that person
- Establishing expectations without stifling enthusiasm
- Defining challenges outside the workplace that affect the individual and their work and well-being
- Never get comfortable

* AIAA 2018-3413, Marren, Daniel E, Dunn, Steven C., and Piscopo, Paul F., *Aerospace Human Resources for the 21st Century: Workforce Challenges Facing Research and Development, AIAA Aviation Forum, June 25-29, 2018*

0900-0930
Challenges Facing the Future Research and Development Workforce, Part 3: Contextual Environment, presented by Steven Dunn and Dan Marren

0930-1130 Panel
Moderator: Dan Marren;
Rapporteur: Steven Dunn

Panelists:

Brianne Williams	**Nancy Andersen**	**Steven Schneider**	**Frank Peri**
The Aerospace Corporation	Johns Hopkins University Applied Physics Laboratory	Purdue University	NASA Langley Research Center

Thursday, 9 January 2020

415-DGE-3 0930 - 1130 hrs	Digital Engineering - Use Case(s) for Realizing Industry Value	Celebration 11

This panel session will provide a forum for exploring the purpose and value associated with digital transformation from a variety of perspectives: DoD, industrial, FFRDC, and academic. In particular, this panel will discuss realized successes, lessons learned, and limitations each of the sectors have experienced on their respective journey to a digital transformation. This panel will also provide insight into why each sector's representative is investing substantial resources for this journey. It is expected that this insight will help provide a collaborative environment/forum to support both expectations and activities towards realizing value for the aerospace sector.

Moderators: Olivia Fischer, Georgia Institute of Technology, and Mat French, Rolls-Royce Corporation

Panelists:

Government Perspective	Industry – OEM Perspective	FFRDC Perspective	Academic Perspective
Pam Kobryn	**Jason Hatakeyama**	**Marilee Wheaton**	**Dimitri Mavris**
Air Force Research Laboratory	The Boeing Company	The Aerospace Corporation	Georgia Institute of Technology

Thursday, 9 January 2020

416-EXPL-4 — **Enabling Technologies** — **Florida Ballroom A**

Chaired by: J. SHEEHY, NASA HQ

0930 hrs	1000 hrs	1030 hrs	1100 hrs			
AIAA-2020-1551	AIAA-2020-1552	AIAA-2020-1553	AIAA-2020-1554			
Tailorable Stiffness Lightweight Soft Robotic Materials with Architectured Exoskeleton	**Full 3D Model for Asteroids Dynamics Estimation in a Monocular Vision-Based System**	**Evaluation of Wearable Inertial Sensors for Spacesuit Design Applications Using Hardware-in-the-Loop Simulation**	**Spaceflight Propulsion and Power Using a Radioisotope Heat Exchanger**			
R. Ghosh, University of Central Florida, Orlando, FL	C. Gunawan, G. Magnani, N. Monge-Raluy, I. Gortazar-Martinez, E. Zenou, Higher Institute of Aeronautics and Space, Toulouse, France	Y. Shen, S. Wood, A. Anderson, University of Colorado, Boulder, Boulder, CO	J. Touma, F. Schauer, C. Hartsfield, Air Force Institute of Technology, Wright-Patterson AFB, OH; M. Fernelius, Air Force Research Laboratory, Wright-Patterson AFB, OH; N. Clark, B. Bohan, Air Force Institute of Technology, Wright-Patterson AFB, OH; et al.			

Thursday, 9 January 2020

417-F360-7
0930 - 1130 hrs

Forum 360: The Next Challenge for Aerospace: Global Climate Change — **Regency Ballroom Q**

Moderator: John Tylko, Chief Innovation Officer, Aurora Flight Sciences

Panelists:

James G. Anderson
Philip S. Weld Professor of Atmospheric Chemistry
Harvard University

Philippe Bonnefoy
Founder & Principal
BlueSky

R. John Hansman
T. Wilson Professor of Aeronautics and Astronautics
Massachusetts Institute of Technology

Thursday, 9 January 2020

418-FD-57 — **Low-Frequency Unsteadiness in Separated Flows II** — **Blue Spring II**

Chaired by: J. WEISS, TU Berlin and J. LITTLE, The University of Arizona

0930 hrs	1000 hrs	1030 hrs	1100 hrs			
Oral Presentation	Oral Presentation	AIAA-2020-1555	Oral Presentation			
DNS study of a turbulent separation bubble with emphasis on low-frequency unsteadiness (Invited)	**Scaling laws for unsteadiness in turbulent shock-boundary layer interactions (Invited)**	**Viscous-inviscid interaction in laminar separation bubbles (invited) (Invited)**	**Low Frequency Unsteadiness in a Mach 4 Transitional Shock Boundary Layer Interaction (Invited)**			
H. Abe, Japan Aerospace Exploration Agency (JAXA), Chofu, Japan	P. Bruce, P. Rabey, Imperial College London, London, United Kingdom; J. Threadgill, University of Arizona, Tucson, Tucson, AZ	O. Marxen, University of Surrey, Guildford, United Kingdom	J. Little, J. Threadgill, University of Arizona, Tucson, Tucson, AZ			

Thursday, 9 January 2020

419-FD-58 — **Special Session: Surging and Surging/Pitching Aerodynamics II** — **Plaza Ballroom F**

Chaired by: O. SAHNI, Rensselaer Polytechnic Institute and J. GREGORY, The Ohio State University

0930 hrs	1000 hrs	1030 hrs	1100 hrs	1130 hrs	1200 hrs	
Oral Presentation	Oral Presentation	AIAA-2020-1556	AIAA-2020-1557	AIAA-2020-1558	Oral Presentation	
Dynamic Stall of a Low Aspect Ratio Wing under Combined Pitching and Surging	**Combined Pitching and Surging of a Low Aspect Ratio Wing**	**Unsteady Vortex Formation on Airfoils with High Surging and Pitching Amplitudes**	**Tailoring Wind Tunnel Gust Spectra with Feedback Control**	**Characteristic Wing Measurements of a NACA 0015 in Steady and Unsteady Surging Wind Tunnel Flow**	**Experimental methods for the flow field study with unsteady model movement in a water towing tank**	
T. De Troyer, Vrije Universiteit Brussel, Brussels, Belgium; D. Hasin, D. Keisar, D. Greenblatt, Technion–Israel Institute of Technology, Haifa, Israel	A. Medina, M. Rockwood, Air Force Research Laboratory, Wright-Patterson AFB, OH	L. Smith, A. Jones, University of Maryland, College Park, College Park, MD	X. He, K. Asztalos, D. Williams, Illinois Institute of Technology, Chicago, IL; K. Buchert, Technical University of Berlin, Berlin, Germany	D. Gloutak, J. Farnsworth, University of Colorado, Boulder, Boulder, CO	M. Jentzsch, H. Schmidt, R. Woszidlo, C. Nayeri, C. Paschereit, Technical University of Berlin, Berlin, Germany	

Thursday, 9 January 2020

420-FD-59	Boundary Layer Transition (BOLT) Flight Experiment Pre-Flight Research II					Orlando Ballroom M
Chaired by: D. BERRIDGE, JHU APL and S. CRAIG, University of Arizona						
0930 hrs AIAA-2020-1559 **Secondary Side Considerations for BOLT Flight Experiment** S. Berry, NASA Langley Research Center, Hampton, VA; B. Wheaton, Johns Hopkins University Applied Physics Laboratory, Laurel, MD; B. Chynoweth, Purdue University, West Lafayette, IN	1000 hrs AIAA-2020-1560 **Transition Measurements with Forward and Aft Facing Steps on the BOLT Geometry at Mach 6** B. Chynoweth, S. Schneider, Purdue University, West Lafayette, IN; B. Wheaton, Johns Hopkins University Applied Physics Laboratory, Laurel, MD	1030 hrs AIAA-2020-1561 **Aeroheating Measurements of BOLT Aerodynamic Fairings and Transition Module** B. Rieken, S. Berry, C. Broslawski, F. Greene, NASA Langley Research Center, Hampton, VA				

Thursday, 9 January 2020

421-FD-60	Discontinuous Galerkin Methods II					Rainbow Spring II
Chaired by: H. LUO, North Carolina State University and Z. WANG, University of Kansas						
0930 hrs AIAA-2020-1562 **Petrov-Galerkin Projection-Based Model Reduction with an Optimized Test Space** G. Collins, K. Fidkowski, C. Cesnik, University of Michigan, Ann Arbor, Ann Arbor, MI	1000 hrs AIAA-2020-1563 **An Adaptive Variational Multiscale Method with Discontinuous Subscales for Aerodynamic Flows** A. Huang, H. Carson, S. Allmaras, M. Galbraith, D. Darmofal, Massachusetts Institute of Technology, Cambridge, MA; D. Kamenetskiy, The Boeing Company, Seattle, WA	1030 hrs AIAA-2020-1564 **An analysis of inviscid transonic flows over three-dimensional wings using the discontinuous Galerkin solver in SU2** J. Choi, J. Alonso, Stanford University, Stanford, CA; E. van der Weide, University of Twente, Enschede, The Netherlands	1100 hrs AIAA-2020-1565 **A *p*-adaptive Discontinuous Galerkin Method for Compressible Flows Using Charm++** W. Li, H. Luo, North Carolina State University, Raleigh, NC; A. Pandare, J. Bakosi, Los Alamos National Laboratory, Los Alamos, NM			

Thursday, 9 January 2020

422-FD-61/PDL-11	Plasma Actuators II					Plaza Ballroom K
Chaired by: J. ZIMMERMAN, CU Aerospace and A. STARIKOVSKIY, Princeton University						
0930 hrs AIAA-2020-1566 **Numerical Modeling of Flow Inducement in a Plasma Actuated Channel** A. Lilley, S. Roy, University of Florida, Gainesville, Gainesville, FL	1000 hrs AIAA-2020-1567 **Experimental Characterization of a Novel Cyclotronic Plasma Actuator** G. Hristov, P. Ansell, University of Illinois, Urbana-Champaign, Urbana, IL; J. Zimmerman, D. Carroll, CU Aerospace, Champaign, IL	1030 hrs AIAA-2020-1568 **Control of Dynamic Stall over a NACA 0012 Airfoil Using NS-DBD Plasma Actuators** N. Whiting, D. Castaneda, N. Webb, M. Samimy, Ohio State University, Columbus, OH				

Thursday, 9 January 2020

423-FD-63	Turbulent Flows V					Rainbow Spring I
Chaired by: A. MAGSTADT, Lockheed Martin Aeronautics and L. DUAN, The Ohio State University						
0930 hrs AIAA-2020-1569 **Molecular-Level Simulations of Compressible Turbulence** M. Gallis, N. Bitter, J. Torczynski, Sandia National Laboratories, Albuquerque, NM	1000 hrs AIAA-2020-1570 **Coherence Analysis of Rotating Turbulent Pipe Flow** J. Davis, S. Ganju, University of Kentucky, Lexington, Lexington, KY; A. Venkatesh, Institute of Chemical Technology, Mumbai, India; N. Ashton, University of Oxford, Oxford, United Kingdom; S. Bailey, C. Brehm, University of Kentucky, Lexington, Lexington, KY	1030 hrs AIAA-2020-1571 **The influence of Reynolds and Froude number on the local distribution of settling, inertial particles in turbulence** M. Momenifar, A. D. Bragg, Duke University, Durham, NC	1100 hrs AIAA-2020-1572 **DNS and LES of the flow over the T106C turbine using the high-order FR/CPR method** M. Alhawwary, Z. Wang, University of Kansas, Lawrence, Lawrence, KS	1130 hrs AIAA-2020-1573 **A velocity potential preserving reduced order approach for the incompressible and unsteady Navier-Stokes equations** N. Akkari, Safran Group, Châteaufort, France	1200 hrs AIAA-2020-1574 **Direct Numerical Simulation of Low Rem Compressible Magnetohydrodynamic Isotropic Turbulence** C. Xu, Beihang University, Beijing, China; Y. Fan, China Academy of Launch Vehicle Technology, Beijing, China; Z. Gao, C. Jiang, C. Lee, Beihang University, Beijing, China	

Thursday, 9 January 2020						
424-FD-64	**Multiphase Flows III**					**Bayhill 18**
Chaired by: C. CARTER, U.S. Air Force Research Laboratory and Y. WANG, New Mexico State University						
0930 hrs AIAA-2020-1575 **A Multistage Approach To Computational Modeling of Large Droplet Breakup** J. Turner, University of Illinois, Urbana-Champaign, Urbana, IL; M. Kinzel, B. Cavainolo, University of Central Florida, Orlando, FL	1000 hrs AIAA-2020-1576 **The Effect of Elevated Temperatures on Airborne Particle Deposition and Rebounds** N. Plewacki, J. Bons, P. Gnanaselvam, Ohio State University, Columbus, OH	1030 hrs AIAA-2020-1577 **Morphology of Bubble Formation on Droplet Impact upon Thin Liquid Layers** D. Ribeiro, University of Beira Interior, Covilha, Portugal; M. Panao, University of Coimbra, Coimbra, Portugal; J. Barata, A. Silva, University of Beira Interior, Covilha, Portugal	1100 hrs AIAA-2020-1578 **3D Simulations of Droplets Impacting Liquid Films: Crown Parameters Measurements** D. Vasconcelos, D. Ribeiro, A. Silva, J. Barata, University of Beira Interior, Covilha, Portugal			

Thursday, 9 January 2020						
425-FD-65	**Instability and Transition V**					**Plaza Ballroom J**
Chaired by: A. TUMIN, The University of Arizona and T. KOCIAN, Texas A&M University						
0930 hrs AIAA-2020-1579 **Mode F/S Wave Packet Interference And Acoustic-like Emissions in a Mach 8 Flow Over a Cone** C. Haley, X. Zhong, University of California, Los Angeles, Los Angeles, CA	1000 hrs AIAA-2020-1580 **Growth of Tollmien-Schlichting Waves over Three-Dimensional Roughness** M. Kuester, Virginia Polytechnic Institute and State University, Blacksburg, VA	1030 hrs AIAA-2020-1581 **DNS investigation of laminar-to-turbulent transition with favorable pressure gradient: effect of surface imperfections** D. Wise, V. Nguyen, K. Chua, Institute of High Performance Computing, Singapore, Singapore; Q. Nguyen, T. Nadesan, Y. Cui, National University of Singapore, Singapore, Singapore	1100 hrs AIAA-2020-1582 **Towards the extension of the discrete element method to Navier-Stokes solvers: a methodology based on RANS simulations and experimental investigations of rough wall flows** D. Toussaint, F. Chedevergne, O. Léon, ONERA, Toulouse, France			

Thursday, 9 January 2020						
426-FD-66	**RANS/LES/Hybrid Turbulence Modeling and Applications III**					**Blue Spring I**
Chaired by: K. BHAGANAGAR and N. MILLER, Sandia National Labs						
0930 hrs AIAA-2020-1583 **Examination of Flow Sensitivities in Turbulence Model Validation Experiments** A. Gargiulo, V. Vishwanathan, D. Fritsch, J. Duetsch-Patel, M. Szoke , A. Borgoltz, Virginia Polytechnic Institute and State University, Blacksburg, VA; et al.	1000 hrs AIAA-2020-1584 **Status of the NASA/Virginia Tech Benchmark Experiments for CFD Validation** T. Lowe, A. Borgoltz, W. Devenport, D. Fritsch, A. Gargiulo, J. Duetsch-Patel, Virginia Polytechnic Institute and State University, Blacksburg, VA; et al.	1030 hrs AIAA-2020-1585 **Assessment of Numerical Dissipation Techniques for Mesh Adaptation in Large Eddy Simulation** Y. Jiang, S. Nadarajah, McGill University, Montréal, Canada	1100 hrs AIAA-2020-1586 **Data-driven Augmentation of RANS Turbulence Models for Improved Prediction of Separation in Wall-bounded Flows** F. Köhler, J. Munz, M. Schäfer, Technical University of Darmstadt, Darmstadt, Germany	1130 hrs AIAA-2020-1587 **Investigation of Flow Past Rotating Cylinder using Transitional RANS models for different Mesh Motion Methodologies** A. Dasgupta, H. Gopalan, Institute of High Performance Computing, Singapore, Singapore; D. Chandar, Queen's University Belfast, Belfast, United Kingdom		

Thursday, 9 January 2020						
427-GNC-25	**Aircraft Traffic Management**					**Bayhill 17**
Chaired by: H. TAHA, University of California, Irvine and D. CARAWAY, Lockheed Martin Aero						
0930 hrs AIAA-2020-1588 **Deriving Estimated Time of Arrival Accuracy Requirements for Time-Based Traffic Management** L. Weitz, B. Lascara, R. Sgorcea, MITRE Corporation, McLean, VA	1000 hrs AIAA-2020-1589 **Aircraft Rerouting under Risk Tolerance during Space Launches** O. Bojorquez, N. Dolan, J. Chen, San Diego State University, San Diego, CA	1030 hrs AIAA-2020-1590 **Bi-level Cross Entropy Method and Optimal Control for Air Traffic Sequencing and Trajectory Optimization** B. Grüter, J. Diepolder, M. Bittner, F. Holzapfel, Technical University of Munich, Munich, Germany; J. Ben-Asher, Technion--Israel Institute of Technology, Haifa, Israel	1100 hrs AIAA-2020-1591 **Cruise Speed Guidance for Trajectory-Based Operations Using Ensemble Weather Forecasts** Y. Matsuno, A. Andreeva-Mori, Japan Aerospace Exploration Agency (JAXA), Tokyo, Japan; R. Kikuchi, Doer Research, Chiba, Japan			

Thursday, 9 January 2020						
428-GNC-26	**Navigation, Estimation, Sensing, and Tracking III**					**Bayhill 33**
Chaired by: J. RUNNELS						
0930 hrs AIAA-2020-1592 **Astrometry and Time-Resolved Photometry From Streaks Using Calibrated Ultra-Wide Field of View Cameras** S. Wishnek, M. Holzinger, University of Colorado, Boulder, Boulder, CO	1000 hrs AIAA-2020-1593 **Identification of the Full Inertial Parameters of a Non-cooperative Target with Eddy Current Detumbling** C. Zhao, Q. Meng, J. Liang, H. Ji, Tsinghua University, Beijing, China	1030 hrs AIAA-2020-1594 **Pulsars as Accelerometers in Space—Towards Solving the "Lost in Space" Problem** J. Runnels, D. Gebre-egziabher, University of Minnesota, Minneapolis, Minneapolis, MN	1100 hrs AIAA-2020-1595 **Composite Magnitude: A tool for creating better star tracker catalogs** S. Khodabakhshian, J. Enright, L. Kazemi, A. Khramtsov, Ryerson University, Toronto, Canada	1130 hrs AIAA-2020-1596 **Relative Inertial Navigation Employing a Common Frame Error Definition** M. Whittaker, J. Crassidis, State University of New York, Amherst, NY		

Thursday, 9 January 2020						
429-GNC-27	**Space Robotic Systems I**					**Bayhill 32**
Chaired by: S. ULRICH, Carleton University						
0930 hrs AIAA-2020-1597 **Rapid Orbital Motion Emulator (ROME): Kinematics** A. Seleit, R. Ketzner, H. Quebedeaux, T. Elgohary, University of Central Florida, Orlando, FL	1000 hrs AIAA-2020-1598 **Pose Tracking Control for Spacecraft Proximity Operations Using the Udwadia-Kalaba Framework** A. Pothen, S. Ulrich, Carleton University, Ottawa, Canada	1030 hrs AIAA-2020-1599 **Immersion and Invariance Adaptive Control for Proximity Operations under Uncertainties and Modeling Errors** J. Hough, S. Ulrich, Carleton University, Ottawa, Canada	1100 hrs AIAA-2020-1600 **On Deep Reinforcement Learning for Spacecraft Guidance** K. Hovell, S. Ulrich, Carleton University, Ottawa, Canada	1130 hrs AIAA-2020-1601 **Realistic Guidance Performances during Lunar Rendezvous with the Third Body Perturbation** G. Bucchioni, University of Pisa, Pisa, Italy; M. Casasco, ESA, Noordwijk, The Netherlands; M. Innocenti, University of Pisa, Pisa, Italy	1200 hrs AIAA-2020-1602 **Tangent Capture of an Uncontrolled Target Satellite by Space Robot: Simulation Studies** K. Seweryn, F. Basmadji, T. Rybus, Polish Academy of Sciences, Warsaw, Poland	

Thursday, 9 January 2020						
430-GNC-28	**Spacecraft and Launch Guidance, Navigation, and Control III**					**Bayhill 31**
Chaired by: L. MASSOTTI, European Space Agency (ESA) and E. GAMBONE, NASA - JSC Int Guid, Navig & Control Analysis Br						
0930 hrs AIAA-2020-1603 **Modular Derivation of the Equations of Motion of a Flexible Launch Vehicle with Propellant Slosh** C. Cossette, J. Forbes, McGill University, Montréal, Canada; D. Saussie, Polytechnique Montréal, Montréal, Canada	1000 hrs AIAA-2020-1604 **Attitude tracking of multiple spacecraft on SO(3) with attitude constraints** T. Chen, J. Shan, York University, Toronto, Canada	1030 hrs AIAA-2020-1605 **Angles-Only State Estimation of Orbital Debris for Direct Capture Mechanisms** D. Doscher, U.S. Military Academy, West Point, NY	1100 hrs AIAA-2020-1606 **Slosh Observer Design for Aeroelastic Launch Vehicles** E. Mooij, Delft University of Technology, Delft, The Netherlands	1130 hrs AIAA-2020-1607 **Multi-User System for Earth Sensing Spacecraft Attitude Calibration Using International Space Station Attitude Information** J. Crassidis, State University of New York, Amherst, NY; M. Whorton, University of Tennessee, Tullahoma, Tullahoma, TN		

Thursday, 9 January 2020						
431-GT-7	**High Reynolds Number Aerodynamics and Testing**					**Bayhill 24**
Chaired by: H. QUIX, European Transonic Windtunnel and M. WRIGHT, European Transonic Windtunnel						
0930 hrs AIAA-2020-1608 **Application of Temperature Sensitive Paint to investigate laminar-to-turbulent transition on nacelles** C. Klein, German Aerospace Center (DLR), Göttingen, Germany	1000 hrs Oral Presentation **A New Efficient Method for Transition Detection by TSP on a Full Span Model by use of Infra-Red Laser** A. Hensch, European Transonic Windtunnel, Cologne, Germany	1030 hrs Oral Presentation **Evaluation of Additive Manufacturing for Cryogenic Wind Tunnel Model Structural Components** D. Chan, NASA Langley Research Center, Hampton, VA	1100 hrs Oral Presentation **Progress on Shape Memory Alloy Remote Control Actuation (SMARCA) Testing in Cryogenic Facilities** F. Calkins, The Boeing Company, Seattle, WA	1130 hrs Oral Presentation **Recent Developments and Upgrades at the National Transonic Facility** D. Saxer, NASA Langley Research Center, Hampton, VA		

Thursday, 9 January 2020

432-HSABP-7	High-Speed Inlets, Isolators and Nozzles					Plaza Ballroom G
Chaired by: L. VANSTONE, University of Texas at Austin and J. EDWARDS						
0930 hrs AIAA-2020-1609 **Structure of a Mach 2 Shock Train from Experimental Measurements** L. Edelman, M. Gamba, University of Michigan, Ann Arbor, Ann Arbor, MI	1000 hrs AIAA-2020-1610 **Pseudoshock Dimensionality in Axisymmetric and Rectangular Scramjets** G. Lee, University of Illinois, Urbana-Champaign, Urbana, IL; D. Baccarella, University of Tennessee, Knoxville, Knoxville, TN; Q. Liu, G. Elliott, T. Lee, University of Illinois, Urbana-Champaign, Urbana, IL	1030 hrs AIAA-2020-1611 **Flow Choking Induced by Combustion and Mass Injection in a Circular Model Scramjet at Mach 4.5** D. Baccarella, University of Tennessee, Knoxville, Knoxville, TN; Q. Liu, G. Lee, T. Lee, University of Illinois, Urbana-Champaign, Urbana, IL	1100 hrs AIAA-2020-1612 **Effects of Detonation Decoupling on the Ignition of a Supersonic Cavity for Scramjets** D. Rosato, K. Ahmed, University of Central Florida, Orlando, FL; D. Cuppoletti, T. Ombrello, C. Carter, S. Hammack, Air Force Research Laboratory, Wright-Patterson AFB, OH	1130 hrs AIAA-2020-1613 **Liquid Jet Interaction with Supersonic Crossflow** V. Singh, N. Joseph, N. Thakor, S. Chaudhuri, Indian Institute of Science, Bengaluru, India		

Thursday, 9 January 2020

433-INPSI-3	Integration of Unconventional Propulsion Subsystems					Bayhill 21
Chaired by: D. CROWE, Air Force Research Laboratory and C. WINKLER, The Boeing Company						
0930 hrs AIAA-2020-1614 **Aggressively-Offset Inlet Flow Facility Design and Characterization** N. Webb, C. O'Neill, M. Samimy, Ohio State University, Columbus, OH	1000 hrs AIAA-2020-1615 **Ingested Particle Redistribution in a Serpentine Engine Inlet** I. Potts, J. Bons, Ohio State University, Columbus, OH	1030 hrs AIAA-2020-1616 **Transient Surrogate Modeling for Thermal Management Systems** A. Van Zwieten, G. Cinar, E. Garcia, J. Gladin, D. Mavris, Georgia Institute of Technology, Atlanta, GA	1100 hrs AIAA-2020-1617 **Small electrically powered contra-rotating turbo fan engines for high-speed aircraft application** T. Ebus, M. Dietz, University of the German Federal Armed Forces, Neubiberg, Germany			

Thursday, 9 January 2020

434-IS-14/GNC-29	NASA - DLR Advanced Flight Control Research (Invited)					Celebration 9
Chaired by: N. NGUYEN, NASA-Ames Research Center and T. LOMBAERTS, NASA Ames Research Center and G. LOOYE, DLR-Oberpfaffenhofen						
0930 hrs AIAA-2020-1618 **Flight Testing a Linear Parameter Varying Control Law on a Passenger Aircraft (Invited)** C. Weiser, D. Ossmann, R. Kuchar, R. Müller, D. Milz, G. Looye, German Aerospace Center (DLR), Wessling, Germany	1000 hrs AIAA-2020-1619 **Dynamic Inversion based Full Envelope Flight Control for an eVTOL Vehicle using a Unified Framework (Invited)** T. Lombaerts, J. Kaneshige, S. Schuet, B. Aponso, K. Shish, G. Hardy, NASA Ames Research Center, Moffett Field, CA	1030 hrs AIAA-2020-1620 **Aircraft Mission Simulation Framework for Loads Analysis (Invited)** S. Schulz, D. Ossmann, D. Milz, T. Kier, G. Looye, German Aerospace Center (DLR), Oberpfaffenhofen, Germany	1100 hrs AIAA-2020-1621 **Analysis of Automatic Control Function Effects on Vertical Tail Plane Critical Load Conditions (Invited)** T. Kier, R. Müller, G. Looye, German Aerospace Center (DLR), Wessling, Germany	1130 hrs AIAA-2020-1622 **Mode-based Sensing and Actuation Techniques for Multi-objective Flexible Aircraft Control (Invited)** K. Hashemi, NASA Ames Research Center, Moffett Field, CA; A. Alder, University of Colorado, Boulder, Boulder, CO; N. Cramer, N. Nguyen, NASA Ames Research Center, Moffett Field, CA	1200 hrs AIAA-2020-1623 **Multi-Objective Flight Control for Ride Quality Improvement for Flexible Aircraft (Invited)** N. Nguyen, K. Hashemi, NASA Ames Research Center, Moffett Field, CA	

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435-IS-15	Systems Health Management					Celebration 10
Chaired by: C. KULKARNI, NASA Ames Research Center and W. MAUL						
0930 hrs AIAA-2020-1624 **Model-based fault diagnostics in an electromechanical actuator of reusable liquid rocket engine** K. Kawatsu, Japan Aerospace Exploration Agency (JAXA), Tsukuba, Japan; S. Tsutsumi, M. Hirabayashi, D. Sato, Japan Aerospace Exploration Agency (JAXA), Sagamihara, Japan	1000 hrs AIAA-2020-1625 **Anomaly Detection using Parity Space Approach in Team of UAVs with Entropy based Distributed Behavior** H. Sevil, University of West Florida, Pensacola, FL	1030 hrs AIAA-2020-1626 **The Effects of Component Degradation on System-Level Prognostics for the Electric Powertrain System of UAVs** T. Darrah, Vanderbilt University, Nashville, TN; C. Kulkarni, NASA Ames Research Center, Moffett Field, CA; G. Biswas, Vanderbilt University, Nashville, TN	1100 hrs AIAA-2020-1627 **Embedded and Enterprise Fault Management for Aerospace Domain** T. Gogg, J. Cheah, G. Ko, T. Lee, R. Kapadia, M. Venkatesh, General Atomics, San Diego, CA	1130 hrs AIAA-2020-1628 **Operational Risk Estimation via a Decomposition-Based Uncertainty Propagation Approach** J. Votion, Y. Cao, University of Texas, San Antonio, San Antonio, TX		

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436-MAT-11/NDA-12/STR-19	Materials and Designs for Additive Manufacturing II					Celebration 6
Chaired by: R. FERTIG, University of Wyoming and S. WANTHAL, Boeing Research & Technology						
0930 hrs AIAA-2020-1629 **Axial-Torsional Fatigue of Additively Manufactured Stainless Steel GP1** S. Siddiqui, Florida Polytechnic University, Lakeland, FL; F. Irmak, University of Central Florida, Orlando, FL; A. Fasoro, Tennessee State University, Nashville, TN; A. Gordon, University of Central Florida, Orlando, FL	1000 hrs AIAA-2020-1630 **Development of 3D Printable Thermally Conductive High-Performance Polymer Composites for Thermal Management Applications** Y. Bozkurt, A. Yildiz, F. Kayginok, E. Akar, U. Emanetoglu, N. Solak, Istanbul Technical University, Istanbul, Turkey; et al.	1030 hrs AIAA-2020-1631 **Multi-Factor Model for Improving the Design of Damping in Additively Manufactured Components** O. Scott-Emuakpor, J. Beck, B. Runyon, T. George, Air Force Research Laboratory, Wright-Patterson AFB, OH	1100 hrs AIAA-2020-1632 **In-Process Monitoring of Continuous Fiber Additive Manufacturing through Force/Torque Sensing on the Nozzle** W. De Backer, P. Sinkez, I. Chhabra, M. Van Tooren, University of South Carolina, Columbia, Columbia, SC; A. Bergs, TIGHITCO, Inc., Charleston, SC			

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437-MDO-16	MDO/SA with Aeroelasticity/FSI II					Celebration 2
Chaired by: J. HICKEN, Rensselaer Polytechnic Institute						
0930 hrs AIAA-2020-1633 **Fluid-Structure Interaction for the Multidisciplinary Design Optimization of Hopper Cars Employing Honeycomb Sandwich Composites** A. Al-Sukhon, M. El Sayed, Carleton University, Ottawa, Canada	1000 hrs AIAA-2020-1634 **Aeroelastic Preliminary-Design Optimization of Communication Tower Structures** V. Suryakumar, Z. Liu, B. Thomsen, A. Tiwari, P. Varkey, J. Marriott, Facebook, Inc., Menlo Park, CA	1030 hrs AIAA-2020-1635 **An Uncoupled Method for Fluid-Structure Interaction Analysis with Application to Aerostructural Design** W. Scholten, D. Hartl, Texas A&M University, College Station, TX	1100 hrs AIAA-2020-1636 **Multi-Fidelity Design of an Aeroelastically Tailored Composite Wing for Dynamic Wind-Tunnel Testing** F. Mitrotta, D. Rajpal, J. Sodja, R. De Breuker, Delft University of Technology, Delft, The Netherlands			

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438-MDO-17/NDA-13	Physics-Informed Machine Learning for Design					Celebration 5
Chaired by: F. VIANA, University of Central Florida and M. RUMPFKEIL, University of Dayton						
0930 hrs AIAA-2020-1637 **Galerkin-Free Technique for the Reduced-Order Modeling of Fluid-Structure Interaction via Machine Learning** M. Whisenant, K. Ekici, University of Tennessee, Knoxville, Knoxville, TN	1000 hrs AIAA-2020-1638 **Development of a Real-Time In-Flight Ice Detection System via Computational Aeroacoustics and Bayesian Neural Networks** B. Zhou, N. Gauger, Technical University of Kaiserslautern, Kaiserslautern, Germany; M. Morelli, A. Guardone, Technical University of Milan, Milan, Italy; J. Hauth, X. Huan, University of Michigan, Ann Arbor, Ann Arbor, MI	1030 hrs AIAA-2020-1639 **Development of a Reinforcement Learning Inspired Monte Carlo Tree Search Optimization Algorithm for Fixed-Wing VTOL UAV Propellers** M. Thiele, A. Staudenmaier, S. Madabhushi Venkata, M. Hornung, Technical University of Munich, Garching, Germany	1100 hrs AIAA-2020-1640 **Deep Gaussian Process Enabled Surrogate Models for Aerodynamic Flows** D. Rajaram, T. Puranik, Georgia Institute of Technology, Atlanta, GA; A. Renganathan, Argonne National Laboratory, Lemont, IL; W. Sung, O. Pinon-Fischer, D. Mavris, Georgia Institute of Technology, Atlanta, GA; et al.			

Thursday, 9 January 2020

439-MST-11	Modeling and Simulation of Aircraft Dynamics					Coral Spring II
Chaired by: A. ELMILIGUI, NASA Langley Research Center and J. SCHROEDER, Federal Aviation Administration						
0930 hrs AIAA-2020-1641 **Air Racer Wake Strength Comparison** S. Glaser, Flight Research, Inc., Mojave, CA	1000 hrs AIAA-2020-1642 **Helicopter Flying Qualities and Performance Test Data Using CCSU Flight Simulator** F. Wei, Central Connecticut State University, New Britain, CT	1030 hrs AIAA-2020-1643 **Modeling and Simulation of Flight Dynamics of a Relative-Roll-Type Parafoil** Y. Ochi, National Defense Academy, Yokosuka, Japan	1100 hrs AIAA-2020-1644 **Development and Validation of a Comprehensive Helicopter Flight Dynamics Code** B. Lee, M. Benedict, Texas A&M University, College Station, TX	1130 hrs AIAA-2020-1645 **Simulation Model Improvement with Aerodynamic Parameter Estimation Techniques** V. Yavuztürk, E. Topbas, TUBITAK, Ankara, Turkey	1200 hrs AIAA-2020-1646 **An Approach to Cost-Effective Wind Tunnel Test Campaign Using Experimental Design and Real-Time Modeling for a Single Use Autonomous Air Vehicle** E. Topbas, V. Yavuztürk, O. Savas, TUBITAK, Ankara, Turkey	

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440-MST-12 — **Modeling and Simulation for Certification and Testing** — **Bayhill 30**

Chaired by: B. APONSO, NASA Ames Research Center and P. ZAAL, NASA Ames Research Center

0930 hrs
AIAA-2020-1647
An Innovative High-Fidelity Approach to Individual Aircraft Tracking
O. Levinski, D. Conser, C. Mouser, Department of Defence, Fishermans Bend, Australia; S. Koschel, R. Carrese, M. Candon, RMIT University, Melbourne, Australia; et al.

1000 hrs
AIAA-2020-1648
Aircraft Survivability Modeling and Simulation Framework (AirSurF)
I. Lunsford, T. Bradley, Colorado State University, Fort Collins, CO

1030 hrs
AIAA-2020-1649
Computational Simulations of a Mach 0.745 \\Transonic Truss-Braced Wing Design
D. Maldonado, Science and Technology Corporation, Hampton, VA; S. Viken, NASA Langley Research Center, Hampton, VA; J. Housman, NASA Ames Research Center, Moffett Field, CA; C. Hunter, NASA Langley Research Center, Hampton, VA; J. Duensing, Science and Technology Corporation, Hampton, VA; N. Frink, NASA Langley Research Center, Hampton, VA; et al.

1100 hrs
AIAA-2020-1650
An Experimental Refinement of Computational Models of Human-Robot Teams
L. Ma, S. Ye, M. IJtsma, K. Feigh, Georgia Institute of Technology, Atlanta, GA; A. Pritchett, Pennsylvania State University, University Park, PA

Thursday, 9 January 2020

441-NDA-14 — **Uncertainty Quantification and Management II** — **Celebration 3**

Chaired by: V. ROMERO, Sandia National Laboratories and A. OLLIKAINEN, Northrop Grumman Aerospace Systems

0930 hrs
AIAA-2020-1651
Damage model parameter identification: Challenges associated with correlation and noise
T. Dong, N. Kim, University of Florida, Gainesville, Gainesville, FL

1000 hrs
AIAA-2020-1652
Bayesian Network Inference of Thermal Protection System Failure in Hypersonic Vehicles
D. Schiavazzi, T. Juliano, University of Notre Dame, Notre Dame, IN

1030 hrs
AIAA-2020-1653
Multimodality data fusion for probabilistic strength estimation of aging materials using Bayesian networks
J. Chen, Y. Liu, Arizona State University, Tempe, AZ

1100 hrs
AIAA-2020-1654
Global Sensitivity Analysis for Stochastic Responses of Fiber Reinforced Composites with Polynomial Chaos
M. Thapa, A. Paudel, S. Mulani, University of Alabama, Tuscaloosa, Tuscaloosa, AL; R. Walters, Virginia Polytechnic Institute and State University, Blacksburg, VA

1130 hrs
AIAA-2020-1655
Resilience-enhancing operations of aerostructural systems under uncertainty: a digital twin approach
P. Karve, Y. Guo, B. Kapusuzoglu, S. Mahadevan, Vanderbilt University, Nashville, TN; M. Haile, Army Research Laboratory, Aberdeen Proving Ground, MD

Thursday, 9 January 2020

442-NW-15 — **Women in Aerospace Networking Breakfast** — **Regency Ballroom O&P**

0930 - 1130 hrs

The Women of Aeronautics and Astronautics and the Diversity Working Group invite students and young professionals to attend a networking breakfast where you'll have the opportunity to hear introductions from all the mentors and then visit with several mentors of your choice for a deeper conversation.

Thursday, 9 January 2020

443-PC-21/PGC-9 — **Challenges and Opportunities in Rotational Detonation Fundamental Research and Engine Developments** — **Manatee Spring II**

0930 - 1230 hrs

In recent years, the rotational detonation engine (RDE) has attracted significant attention and been supported by multiple federal agencies for a diverse set of applications. Significant progresses have been made in detonation fundamentals and modeling/simulation capabilities. These understanding and tool capabilities have significantly accelerated RDE engineering developments. From recent efforts, it has become clear that the detonation structure, dynamics and propagation are strongly depend on local mixture and geometric boundary conditions but more quantitative characterizations are still needed. Adequate combustion chemistry models have been established for detonation in H/HC fuel based mixture (HyChem etc.) but they are still too computational intensive. In RDE, fine scale turbulent structures the shock-laden environment and their impacts on mixing govern local mixture conditions and needs to be better understood and quantified. Other remaining challenges include but not limited to: detonation propagation through variable mixture conditions, deflagration to detonation transition and interaction between deflagration and detonation, material and thermal management as well as efficient/automated RDE design tools and related computational challenges. This panel is composed of a wide range of leading experts from fundamental detonation research, modeling and simulation to engineering RDE development. Objectives of the panel are to discuss the current landscape of fundamental understanding and key engineering challenges and explore related research and engineering opportunities.

Panelists:

Kareem Ahmed	**Carl Knowlen**	**Carson Slabaugh**	**Graham Candler**	**Joseph Oefelein**	**Venkat Raman**	**Christopher Lietz**
University of Central Florida	University of Washington	Purdue University	University of Minnesota	Georgia Institute of Technology	University of Michigan	Air Force Research Laboratory

Thursday, 9 January 2020						
444-PC-22	**Laminar Flames**					**Bayhill 25**
Chaired by: Y. JU, Princeton University and H. IM, King Abdullah University of Science and Technology						
0930 hrs AIAA-2020-1656 **Multiscale Modeling of Autoignition-Assisted Cool Flames at High Temperatures and Pressures** T. Zhang, Y. Ju, Princeton University, Princeton, NJ	1000 hrs AIAA-2020-1657 **Progress Toward Flame Thickness Measurements from Chemiluminescence of Spherical Flames** M. Turner, T. Paschal, P. Parajulli, W. Kulatilaka, E. Petersen, Texas A&M University, College Station, TX	1030 hrs AIAA-2020-1658 **A Numerical Study on Soot Formation and Evolution in Co-flow Diffusion Flames under Elevated Pressures** D. Zhou, S. Zou, S. Yang, University of Minnesota, Minneapolis, Minneapolis, MN	1100 hrs AIAA-2020-1659 **Computational investigation of rod-stabilized laminar premixed hydrogen–methane–air flames** F. Hernandez Perez, H. Im, King Abdullah University of Science and Technology, Thuwal, Saudi Arabia; A. Tingas, University of the Highlands and Islands, Perth, United Kingdom	1130 hrs AIAA-2020-1660 **An analysis of soot formation pathways in laminar coflow ethylene flame at higher pressures** J. Guo, P. Selvaraj, King Abdullah University of Science and Technology, Thuwal, Saudi Arabia; Y. Tang, University of Michigan, Ann Arbor, Ann Arbor, MI; H. Im, King Abdullah University of Science and Technology, Thuwal, Saudi Arabia; V. Raman, University of Michigan, Ann Arbor, Ann Arbor, MI		

Thursday, 9 January 2020						
445-PDL-12	**Plasma Assisted Combustion I**					**Bayhill 26**
Chaired by: S. LEONOV, University of Notre Dame and A. TROPINA, Texas A&M University						
0930 hrs AIAA-2020-1661 **Thermal-Chemical Plasma Instability in a Reacting Flow** H. Zhong, M. Shneider, Princeton University, Princeton, NJ; M. Mokrov, Russian Academy of Sciences, Moscow, Russia; Y. Ju, Princeton University, Princeton, NJ	1000 hrs AIAA-2020-1662 **Experimental study of energy delivered to the filaments in high pressure nanosecond surface discharge** C. Ding, A. Jean, S. Shcherbanev, École Polytechnique, Palaiseau, France; I. Selivonin, I. Moralev, Russian Academy of Sciences, Moscow, Russia; N. Popov, Moscow State University, Moscow, Russia; et al.	1030 hrs AIAA-2020-1663 **Modeling of streamer interaction with dense and rarefied flat gaseous layers** A. Starikovskiy, Princeton University, Princeton, NJ	1100 hrs AIAA-2020-1430 **Determination of Electrical Conductivity in Potassium Seeded Oxy-Fuel Flame using RF Coil Approach** M. Paul Irudayaraj, C. Bedick, National Energy Technology Laboratory, Pittsburgh, PA	1130 hrs AIAA-2020-1431 **Towards Supersonic Flat-Wall Flame Holding with Nanosecond-Pulsed High-Frequency Discharges** N. Tichenor, Texas A&M University, College Station, TX; R. Leiweke, T. Ombrello, Air Force Research Laboratory, Wright-Patterson AFB, OH		

Thursday, 9 January 2020						
446-SAT-1	**Society and Aerospace Technology**					**Silver Spring I**
Chaired by: M. KUESTER, Virginia Tech and C. MAI, Government Accountability Office						
0930 hrs AIAA-2020-1664 **A Pilot Study on Monitoring Airline Pilot Stress Levels** M. Rhudy, S. Dolan, Pennsylvania State University, Reading, PA; A. Wagner, Pennsylvania State University, University Park, PA	1000 hrs **Open Discussion**					

Thursday, 9 January 2020						
447-SATS-3	**Small Satellites Hardware**					**Celebration 14**
Chaired by: J. STRAUB, North Dakota State University						
0930 hrs AIAA-2020-1665 **Two-Fault Tolerant Cold Gas Propulsion System for Spacecraft-Inspection CubeSat** J. Day, C. Lorenzen, A. Henriquez, S. Robinson, University of California, Davis, Davis, CA	1000 hrs AIAA-2020-1666 **An Adaptable, Modular Cold-Gas Propulsion System for Small Satellite Applications** S. Aslan, J. Fares, M. DiStefano, M. Peck, Cornell University, Ithaca, NY					

Thursday, 9 January 2020						
448-SCS-7	**Spacecraft Structures Test, Analysis, and Correlation**					**Celebration 12**
Chaired by: T. BARTKOWICZ, Boeing Defense, Space & Security and V. CORMARKOVIC, NASA -Jet Propulsion Laboratory						
0930 hrs AIAA-2020-1667 **Multi-Physics Approach to Simulate Dust Accumulation and Removal** Z. Smith, B. Ross, MotionPort, St. George, UT; J. Blandino, Virginia Military Institute, Lexington, VA	1000 hrs AIAA-2020-1668 **Development and Test of an Additively Manufactured ESPA Class Satellite** T. Cote, R. Spicer, A. Kearns, N. Do, H. Soliman, Northrop Grumman Corporation, Dulles, VA	1030 hrs AIAA-2020-1669 **On Engineering Spreadsheet Software and Its Synthesis with Classic Solution Approaches** G. Greschik, TentGuild Engineering Company, Boulder, CO	1100 hrs AIAA-2020-1670 **Demonstration of Deployment Accuracy of the Starshade Inner Disk Subsystem** M. Arya, D. Webb, J. Steeves, P. Lisman, P. Willems, S. Bradford, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA; et al.	1130 hrs AIAA-2020-1671 **Optimization and demonstration of 3D self-assembly system of hierarchical modular space structure using electromagnet** A. Torisaka, Tokyo Metropolitan University, Hino, Japan; S. Hasegawa, S. Miura, V. Parque, T. Miyashita, H. Yamakawa, Waseda University, Shinjuku, Japan; et al.	1200 hrs AIAA-2020-1672 **Boom Deployment Mechanism for CubeSats** G. Sullivan, J. Blandino, T. Hayes, Virginia Military Institute, Lexington, VA	

Thursday, 9 January 2020						
449-SD-14	**Aeroservovelasticity**					**Celebration 1**
Chaired by: J. COOPER, University of Bristol and K. SINGH, Miami University						
0930 hrs AIAA-2020-1673 **Discrete Time State-Space Aeroservoelastic Modeling Using FUN3D** Z. Wang, D. Sarhaddi, P. Chen, ZONA Technology, Inc., Scottsdale, AZ	1000 hrs AIAA-2020-1674 **Aeroservoelastic Response and Stability Framework with Computational Aerodynamics** M. Karpel, Karpel Dynamic Consulting, Tel Aviv, Israel; M. Weiss, Technion-Israel Institute of Technology, Haifa, Israel; J. Barrera Rodriguez, E. Santos Fernandez, F. Arevalo, H. Climent Mañez, Airbus Defence & Space, Madrid, Spain	1030 hrs AIAA-2020-1675 **Evaluating Power Requirements of Electro-Hydraulic Actuators for Active Aeroservoelastic Control** D. Oliver, K. Singh, Miami University, Oxford, OH	1100 hrs AIAA-2020-1676 **Nonlinear Aeroservoelastic Control in the Presence of Uncertainty** N. D'Amico, University of Florence, Florence, Italy; L. Adamson, S. Fichera, P. Paoletti, University of Liverpool, Liverpool, United Kingdom; G. Innocenti, University of Florence, Florence, Italy; J. Mottershead, University of Liverpool, Liverpool, United Kingdom	1130 hrs AIAA-2020-1677 **Active Flutter Suppression Analysis and Wind Tunnel Studies of an Uncertain Commercial Transport Configuration** L. Marchetti, A. De Gaspari, L. Riccobene, F. Toffol, F. Fonte, S. Ricci, Technical University of Milan, Milan, Italy; et al.		

Thursday, 9 January 2020						
450-SD-15	**Multibody Dynamics Applications**					**Celebration 15**
Chaired by: D. KUMAR, Boeing Research and Technology and W. SCHNEIDER, Lockheed Martin Aeronautics						
0930 hrs AIAA-2020-1678 **Deployable Wing Model Using ANCF and UVLM: Multibody Dynamic Simulation and Wind Tunnel Experiment** K. Otsuka, Tohoku University, Sendai, Japan; Y. Wang, University of Warwick, Coventry, United Kingdom; K. Fujita, H. Nagai, K. Makihara, Tohoku University, Sendai, Japan	1000 hrs AIAA-2020-1679 **Refinements to the MSC/Adams Model of the Skycrane Event for the Mars 2020 Rover** G. Antoun, ATA Engineering, Inc., Lakewood, CO; R. Nayeri, C. Peng, S. Lih, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA	1030 hrs AIAA-2020-1680 **Multibody Dynamics Simulations of Distributed Electric Propellers of X-57 Aircraft** K. Nelson, J. Shen, University of Alabama, Tuscaloosa, Tuscaloosa, AL	1100 hrs AIAA-2020-1681 **The Use of an Inerter in an Aircraft Landing Gear Suspension for Improved Passenger and Crew Comfort at Touchdown** T. Stachiw, F. Khouli, R. Langlois, F. Afagh, Carleton University, Ottawa, Canada			

Thursday, 9 January 2020						
451-SEN-5	**Fusion for Air Traffic Management**					**Celebration 8**
Chaired by: R. MOSELEY, Lockheed Martin Aeronautics Company						
0930 hrs AIAA-2020-1682 **Fusion of Point Clouds for Obstacle Tracking during Airport Ground Operations** K. Theuma, J. Gauci, K. Chircop, D. Zammit-Mangion, University of Malta, Msida, Malta	1000 hrs AIAA-2020-1683 **Application of Machine Learning to the Analysis and Prediction of the Coincidence of Ground Delay Programs and Ground Stops** E. Mangortey, M. Bleu-Laine, T. Puranik, O. Pinon-Fischer, D. Mavris, Georgia Institute of Technology, Atlanta, GA	1030 hrs AIAA-2020-1684 **Prediction and Analysis of Ground Stops with Machine Learning** E. Mangortey, T. Puranik, O. Pinon-Fischer, D. Mavris, Georgia Institute of Technology, Atlanta, GA	1100 hrs AIAA-2020-1685 **Snow and ice monitoring technique for the contaminated runway** S. Hoshino, K. Hashimoto, Japan Aerospace Exploration Agency (JAXA), Tokyo, Japan; K. Tateyama, Y. Harada, Kitami Institute of Technology, Kitami, Japan; Y. Sato, Y. Ikeda, Mitsubishi Corporation, Nagoya, Japan; et al.			

Thursday, 9 January 2020						
452-SFM-19	**Attitude Dynamics, Determination and Control II**					**Bayhill 27**
Chaired by: C. D'SOUZA, NASA-Johnson Space Center						
0930 hrs AIAA-2020-1686 **Attitude Control of an Underactuated Planar Multibody System Using Momentum Preserving Internal Torques** F. Trovarelli, M. McRobb, Z. Hu, C. McInnes, University of Glasgow, Glasgow, United Kingdom	1000 hrs AIAA-2020-1687 **Control Allocation and Quantization of a GEO Satellite with 4DOF Gimbaled Thruster Booms** R. Caverly, University of Minnesota, Minneapolis, Minneapolis, MN; S. Di Cairano, A. Weiss, Mitsubishi Corporation, Cambridge, MA	1030 hrs AIAA-2020-1688 **Three-Axis Magnetometer Calibration Using Total Least Squares** J. Crassidis, State University of New York, Amherst, NY; Y. Cheng, Mississippi State University, Mississippi State, MS	1100 hrs AIAA-2020-1689 **Spacecraft Attitude Testbed (SAT)** A. Bani Younes, San Diego State University, San Diego, CA	1130 hrs AIAA-2020-1690 **Achieving optimal attitude control and minimum energy consumption through dynamic solver and artificial intelligence for a Two-CubeSat Virtual Telescope** R. Pirayeshshirazinezhad, M. Martinez-Ramon, S. Biedron, University of New Mexico, Albuquerque, Albuquerque, NM; A. Naseri, Utah State University, Logan, UT; N. Shah, NASA Goddard Space Flight Center, Washington, D.C., D.C.; S. Stochaj, New Mexico State University, Las Cruces, NM; et al.		

Thursday, 9 January 2020						
453-SFM-20	**Low-Thrust Trajectory Design and Optimization I**					**Bayhill 29**
Chaired by: A. DUTTA, Wichita State University						
0930 hrs AIAA-2020-1691 **Multi-Impulse to Time Optimal Finite Burn Trajectory Conversion** J. Fogel, M. Widner, J. Williams, A. Batcha, NASA Johnson Space Center, Houston, TX	1000 hrs AIAA-2020-1692 **Minimum-Fuel Low-Thrust Transfers for Spacecraft: An Alternative Convex Approach** C. Bergin, G. McGlothin, S. McDonald, Z. Wang, University of Tennessee, Knoxville, Knoxville, TN	1030 hrs AIAA-2020-1693 **Optimization of Low-Thrust Gravity-Assist Trajectories via Optimality-Preserving Transformation** Z. Chi, Tsinghua University, Beijing, China; G. Tang, University of Illinois, Urbana-Champaign, Urbana, IL; F. Jiang, J. Li, Tsinghua University, Beijing, China	1100 hrs AIAA-2020-1694 **Low-Thrust Trajectory Design Using Closed-Loop Feedback-Driven Control Laws and State-Dependent Parameters** H. Holt, University of Surrey, Guildford, United Kingdom; R. Armellin, Institut Supérieur de L'Aéronautique et de l'Espace, Toulouse, France; A. Scorsoglio, R. Furfaro, University of Arizona, Tucson, Tucson, AZ	1130 hrs AIAA-2020-1695 **Using finite differences to improve Shape-Based Approximation methods for Low-Thrust Trajectory Design** B. Wall, Embry-Riddle Aeronautical University, Prescott, AZ		

Thursday, 9 January 2020						
454-SFM-21	**Orbit Determination and Estimation Theory II**					**Bayhill 28**
Chaired by: R. PARK, Jet Propulsion Laboratory						
0930 hrs AIAA-2020-1696 **Adaptive Confidence Filter Update for High Uncertainty Environments** G. Fritsch, K. DeMars, Texas A&M University, College Station, TX	1000 hrs AIAA-2020-1697 **Information-based Particle Flow for High Uncertainty Estimation** K. Ward, K. DeMars, Missouri University of Science and Technology, Rolla, MO	1030 hrs AIAA-2020-1698 **Orbit Determination Using Line-of-Sight and Range Measurements Between Multiple Spacecraft** C. Gnam, A. Dianetti, J. Crassidis, State University of New York, Amherst, NY	1100 hrs AIAA-2020-1699 **Effects of Ground Station Delays on Plasma Calibrations for Juno Orbit Determination** M. Zannoni, University of Bologna, Forli, Italy	1130 hrs AIAA-2020-1700 **Near Rectilinear Halo Orbit Determination with Simulated DSN Observations** N. Parrish, E. Kayser, S. Udupa, J. Parker, B. Cheetham, Advanced Space, LLC, Boulder, CO; D. Davis, a.i. solutions, Inc., Houston, TX	1200 hrs AIAA-2020-1701 **BepiColombo Orbit Determination activities during electric propulsion arcs** F. Castellini, Telespazio-VEGA GmbH for ESA/ESOC, Darmstadt, Germany; G. Bellei, Deimos Space for ESA/ESOC, Darmstadt, Germany; F. Budnik, ESA, Darmstadt, Germany	

Thursday, 9 January 2020

455-STR-13 0930 - 1230 hrs	Composite Airframe Certification and Aging Challenges	Plaza Ballroom H

Transport Aircraft Composite Aging
Allen Fawcett
Senior Technical Fellow, Structures
Boeing Commercial Airplanes

Panel: Composite Airframe Certification Challenges and Interactions - Material & Process Control, Structural Substantiation (Static, Fatigue and Damage Tolerance) and Aging/Life: Discussion on technical areas that are critical to successful composite applications as a continuation of the 2020 Structures, Structural Dynamics, and Materials Lecture (*Certifying Innovative Composite Applications*, Larry Ilcewicz and Cynthia Ashforth)

Moderator: Cynthia Ashforth, Senior Technical Specialist, Composites, Federal Aviation Administration

Panelists:

Laurent Risse
Senior Expert, Composite Analysis
Airbus

Allen Fawcett
Senior Technical Fellow, Structures
Boeing Commercial Airplanes

David Mollenhauer
Principal Materials Engineer, Composites Branch – Materials and Manufacturing Directorate
Air Force Research Laboratory

Larry Ilcewicz
Chief Scientific & Technical Advisor, Composites
Federal Aviation Administration

Gerald Mabson
Technical Fellow, Structures
Boeing Research and Technology

Thursday, 9 January 2020

456-TES-3	Combustion Modeling, Alternative Fuels, and Thermal Management in Terrestrial Energy Systems					Rock Spring I & II
Chaired by: T. ABDEL-SALAM, East Carolina University and S. SHERIF, University of Florida						
0930 hrs AIAA-2020-1702 **Insight into Pyrolysis Kinetics on Lignin Surface via In-situ Spectroscopic Techniques** K. Burra, A. Gupta, University of Maryland, College Park, College Park, MD	1000 hrs AIAA-2020-1703 **Assessment of Alkylbenzenes with an Aim to Reducing Emissions from Direct Injection Ignition Engines** B. Almohammadi, University of Sheffield, Sheffield, United Kingdom; P. Singh, S. Sharma, S. Kumar, Indian Institute of Technology Bombay, Mumbai, India; B. Khandelwal, University of Sheffield, Sheffield, United Kingdom	1030 hrs Oral Presentation **Future Alternative Fuels with Low Aromatic Content** B. Khandelwal, University of Sheffield, Sheffield, United Kingdom	1100 hrs AIAA-2020-1704 **Investigation of Camelina Oil Derived Jet Fuel Blends on Performance and Emissions under Distributed Combustion Condition** J. Feser, Z. Wang, A. Gupta, University of Maryland, College Park, College Park, MD	1130 hrs AIAA-2020-1705 **CH-PLIF Diagnostics of High Intensity Turbulent Premixed Methane-Air Combustion** M. Hossain, M. Islam, W. Hossain, A. Choudhuri, University of Texas, El Paso, El Paso, TX		

Thursday, 9 January 2020

457-TP-10	Thermal Protection Systems: Experimental Facilities					Plaza Ballroom E
Chaired by: W. KLEB, NASA-Langley Research Center and A. NAGLE, Ball Aerospace						
0930 hrs AIAA-2020-1706 **Detection of Spallation Phenomena on Ablator Surfaces** F. Grigat, S. Loehle, University of Stuttgart, Stuttgart, Germany; F. Zander, University of Southern Queensland, Toowoomba, Australia; S. Fasoulas, University of Stuttgart, Stuttgart, Germany	1000 hrs AIAA-2020-1707 **Analysis of spallation products using arc-jet experiments** K. Price, J. Hardy, C. Borchetta, University of Kentucky, Lexington, Lexington, KY; F. Panerai, University of Illinois, Urbana-Champaign, Urbana, IL; S. Bailey, A. Martin, University of Kentucky, Lexington, Lexington, KY	1030 hrs AIAA-2020-1708 **Temperature and radiation measurements of an atmospheric pressure CO_2 plasma** C. Grimaldi, S. McGuire, C. Laux, CentraleSupélec, Gif-sur-Yvette, France	1100 hrs AIAA-2020-1709 **Calculation of Strong Shock Wave Propagation in an Expansion Tube** T. Sakai, H. Takami, Tottori University, Tottori, Japan; H. Tanno, Japan Aerospace Exploration Agency (JAXA), Kakuda, Japan	1130 hrs AIAA-2020-1710 **High-Fidelity Numerical Analysis of Arc-Jet Aerothermal Environments** P. Ventura Diaz, A. Parente, J. Meurisse, S. Yoon, N. Mansour, NASA Ames Research Center, Moffett Field, CA		

Thursday, 9 January 2020						
458-TP-11	**Non-Equilibrium Flows II**					**Orlando Ballroom N**
Chaired by: T. SCHWARTZENTRUBER, University of Minnesota and K. WEED, Ball Aerospace & Technologies Corporation						
0930 hrs AIAA-2020-1711 **Master Equation Analysis and Rotational Relaxation Time for N_2-N_2** S. Jo, O. Kwon, Korea Advanced Institute of Science and Technology, Daejeon, South Korea; J. Kim, Sejong University, Seoul, South Korea	1000 hrs AIAA-2020-1712 **State-to-state and direct molecular simulation study of energy transfer and dissociation of nitrogen mixtures** R. Macdonald, E. Torres, T. Schwartzentruber, University of Minnesota, Twin Cities, Minneapolis, MN; M. Panesi, University of Illinois, Urbana-Champaign, Urbana, IL	1030 hrs AIAA-2020-1713 **Atomic State-to-State Modeling of Ionization Nonequilibrium in a Recombining Nitrogen Plasma** P. Mariotto, A. Tibère-Inglesse, CentraleSupélec, Paris, France; R. Gollan, P. Jacobs, University of Queensland, St. Lucia, Australia; M. Perrin, C. Laux, CentraleSupélec, Paris, France	1100 hrs AIAA-2020-1714 **Verification and Improvement of Impulsive Model for Dissociation of Diatomic Molecules in DSMC** H. Luo, A. Alexeenko, S. Macheret, Purdue University, West Lafayette, IN	1130 hrs AIAA-2020-1715 **Non-Boltzmann Vibrational Energy Distribution Model for Shock-Heated Flows** N. Singh, T. Schwartzentruber, University of Minnesota, Minneapolis, Minneapolis, MN	1200 hrs AIAA-2020-1716 **Consistent Kinetic And Continuum Dissociation Models For High-Temperature Air** N. Singh, T. Schwartzentruber, University of Minnesota, Twin Cities, Minneapolis, MN	

Thursday, 9 January 2020						
459-UAS-7	**UAS Guidance, Navigation, and Control IV**					**Celebration 16**
Chaired by: S. SMITH, University of Kentucky						
0930 hrs AIAA-2020-1717 **A Distributed, Greedy Planner for Multiple sUAS using Expected Downstream Information Gain** J. Jackson, E. Frew, University of Colorado, Boulder, Boulder, CO	1000 hrs AIAA-2020-1718 **Guidance of Unmanned Aerial Gliders for Wildfire Surveillance** F. El Tin, I. Sharf, M. Nahon, McGill University, Montréal, Canada	1030 hrs AIAA-2020-1719 **Globally exponentially stable wind estimation for small fixed-wing UAVs using standard sensors** B. Stovner, T. Johansen, Norwegian University of Science and Technology, Trondheim, Norway	1100 hrs AIAA-2020-1720 **Skyhunter UAS Dynamic Model and Optimal Static Margin Analysis** N. Stefan, P. Storment, J. Rech, K. Crawford, K. Herda, R. Totleben, University of Kansas, Lawrence, Lawrence, KS	1130 hrs AIAA-2020-1721 **UAV Aircraft Carrier Landing Using CFD-Based Model Predictive Control** J. Lorenzetti, A. McClellan, C. Farhat, M. Pavone, Stanford University, Stanford, CA		

Thursday, 9 January 2020		
460-HUB-13 **1000 - 1030 hrs**	**Lilium: An Air Taxi to Revolutionize the Way We Travel**	**the HUB**
A presentation on Lilium vision for revolutionize the way we travel offering the first Urban Air Mobility service. The four pillars of Lilium's vision are to democratize travel, connect the unconnected, reduce our impact on the environment, and use technology as a force for good. The 5 seats Lilium Jet will be presented as well.		

Thursday, 9 January 2020		
461-HUB-14 **1030 - 1130 hrs**	**The Weiss School, BLUECUBE Aerospace High School Project Update**	**the HUB**
Middle School Students from The Weiss School, escorted by members of the AIAA Palm Beach Section, will present the latest developments of their BLUECUBE Aerospace High School CubeSat Project.		

Thursday, 9 January 2020		
462-HUB-15 **1130 - 1230 hrs**	**ICYMI: Forum 360 Rising Leaders Idea Challenge**	**the HUB**
Did you miss the Wednesday afternoon Forum 360 where teams of aerospace's rising leaders pitched there perspective on bringing the world closer? Perhaps you didn't miss it, but have more questions or want to meet the winners of the Idea Challenge? Stop by the HUB for a recap on the winning pitch and opportunity to network with aerospace's up & coming leaders.		

Thursday, 9 January 2020		
463-RLA-4 **1200 - 1400 hrs**	**RLA Lunch Panel: Dawning of the Age of Intelligent Machines and the Future Workforce**	**Regency Ballroom O&P**
Humankind progressed from the industrial age to the information age and now to the dawning of the age of intelligent machines. What is the anatomy of this new world? What are the architectural, design, engineering, and operational issues? What are the strategic technical and nontechnical challenges and constraints? How do we prepare our current and future workforce for this exciting new age?		

Thursday, 9 January 2020		
464-HUB-16 **1230 - 1400 hrs**	**Paws for a Break: Therapy Puppies and Movie Screening**	**the HUB**
Join us for a four-legged meet-and-greet! Attendees will have the opportunity to pet and cuddle with puppies from Pet Rescue By Judy. Animal-assisted interventions (AAI) can have a significant, positive impact on human health and well-being, so clear some time to recharge with puppy therapy. At the same time, the HUB will be showing the Apollo 11 documentary featuring never-before-seen footage and audio recordings that take you into the heart of NASA's historic mission. Popcorn will be provided!		

Thursday, 9 January 2020

465-LUNCH-4 1230 - 1400 hrs	SciTech Forum Awards Luncheon	Windermere Ballroom

Join us as we celebrate the excellence of the aspiring, innovating, and inspiring members of our aerospace community.

Thursday, 9 January 2020

466-AA-9 — Computational Aeroacoustics (CAA) — Peacock Spring

Chaired by: C. PARKER and J. GALLMAN, Northrop Grumman Aerospace Systems

1400 hrs AIAA-2020-1722 **Aeroacoustic computations of tones generated from low mach number cavity flows, using a preconditioned method** B. Paul, Alion Science and Technology, Harrisburg, PA; P. Morris, Pennsylvania State University, University Park, PA	1430 hrs AIAA-2020-1723 **LES prediction for acoustic noise of airfoil at high angle of attack** A. Aihara, A. Goude, H. Bernhoff, Uppsala University, Uppsala, Sweden	1500 hrs AIAA-2020-1724 **Implementation of a FWH approach in a high-order LES tool for aeroacoustic noise predictions** M. Alhawwary, Z. Wang, University of Kansas, Lawrence, Lawrence, KS	1530 hrs AIAA-2020-1725 **Computational analysis and stability of thermally non-uniform supersonic jets** M. Chauhan, L. Massa, T. Lowe, Virginia Polytechnic Institute and State University, Blacksburg, VA			

Thursday, 9 January 2020

467-AA-10 — Airframe/Propulsion Integration — Bayhill 19

Chaired by: C. BROWN, NASA Glenn and N. AGARWAL, The Boeing Company

1400 hrs AIAA-2020-1726 **An Aeroacoustic Study of the Nose Landing Gear with Emphasis on Steering Actuators, Torque Link and Tow Hook** O. Coskun, P. McCarthy, A. Ekmekci, University of Toronto, Toronto, Canada	1430 hrs AIAA-2020-1727 **Adjoint-based Trailing-edge Noise Minimization using Stochastic Noise Generation** B. Zhou, N. Gauger, Technical University of Kaiserslautern, Kaiserslautern, Germany; S. Satcunanathan, M. Meinke, W. Schroeder, RWTH Aachen University, Aachen, Germany	1500 hrs AIAA-2020-1728 **A Machine Learning Approach to Jet-Surface Interaction Noise Modeling** C. Brown, J. Dowdall, B. Whiteaker, L. McIntyre, NASA Glenn Research Center, Cleveland, OH	1530 hrs AIAA-2020-1729 **A CFD-based methodology for aerodynamic-aeroacoustic shape optimization of airfoils** N. Ricks, P. Tsirikoglou, F. Contino, G. Ghorbaniasl, Vrije Universiteit Brussel, Brussels, Belgium	1600 hrs AIAA-2020-1730 **Improved Noise Abatement Departure Procedure Modeling for Aviation Environmental Impact Assessment** D. Lim, A. Behere, Y. Jin, Y. Li, M. Kirby, Z. Gao, Georgia Institute of Technology, Atlanta, GA; et al.	1630 hrs AIAA-2020-1731 **Sensitivity Analysis of Airport level Environmental Impacts to Aircraft thrust, weight, and departure procedures** A. Behere, D. Lim, Y. Li, Y. Jin, Z. Gao, M. Kirby, Georgia Institute of Technology, Atlanta, GA; et al.	

Thursday, 9 January 2020

468-ACD-15/UAS-8 — Design of Unmanned Aerial Systems I — Celebration 8

Chaired by: M. LOGAN, NASA Langley Research Center and W. ALVES, Embraer S. A.

1400 hrs AIAA-2020-1732 **Design and Fabrication of a Battery-Powered Unmanned Aerial Vehicle for Precision Agricultural Monitoring Missions** M. Hossain, S. Islam, M. Muneer, A. Tuba, L. Hasan, S. Siddique, North South University, Dhaka, Bangladesh	1430 hrs AIAA-2020-1733 **Conceptual Design of a Highly-Maneuverable Transitional VTOL UAV with New Maneuver and Control Capabilities** A. Kamal, Military Technical College, Cairo, Egypt; A. Ramirez-Serrano, University of Calgary, Calgary, Canada	1500 hrs AIAA-2020-1734 **Parametric Study of Mars Helicopter for Pit Crater Exploration** K. Fujita, Tohoku University, Sendai, Japan; H. Karaca, Technical University of Darmstadt, Darmstadt, Germany; H. Nagai, Tohoku University, Sendai, Japan	1530 hrs AIAA-2020-1735 **An Investigation of Quad-rotor Aircraft Performance under Gust Wind and Heavy Rain Impacts** T. Wan, Tamkang University, New Taipei, Taiwan	1600 hrs AIAA-2020-1736 **On the Optimization Performance Study of Flapping Aerial Vehicle under Heavy Rain Condition** T. Wan, Tamkang University, New Taipei, Taiwan		

Thursday, 9 January 2020

469-AFM-16 — Aerocapture Flight Mechanics and Performance — Bayhill 18

Chaired by: C. KARLGAARD, Analytical Mechanics Associates Inc and Z. WANG, University of Tennessee and S. D'SOUZA, NASA-ARC

1400 hrs AIAA-2020-1737 **Conceptual Development of AeroDrop: Aerocapture and Direct Entry for Two Spacecraft on a Common Approach Trajectory** S. Albert, R. Braun, University of Colorado, Boulder, Boulder, CO	1430 hrs AIAA-2020-1738 **Comparison of Aerocapture Performance Using Bank Control and Direct Force Control with Two Human-Scale Vehicles at Mars** D. Matz, C. Cerimele, R. Sostaric, NASA Johnson Space Center, Houston, TX	1500 hrs AIAA-2020-1739 **Analysis of Hypersonic Tip-Off Rates for Venus Aerocapture** A. Rollock, R. Braun, University of Colorado, Boulder, Boulder, CO	1530 hrs AIAA-2020-1740 **Aerocapture Mission Analysis** J. Engelsma, E. Mooij, Delft University of Technology, Delft, The Netherlands	1600 hrs AIAA-2020-1741 **Aerocapture Trajectory Design in Uncertain Entry Environments** C. Heidrich, R. Braun, University of Colorado, Boulder, Boulder, CO	1630 hrs AIAA-2020-1742 **Derivation of Atmospheric Flight Equations of Motion using Lagrangian Dynamics and its Application to Aerocapture** R. Deshmukh, D. Spencer, J. Longuski, Purdue University, West Lafayette, IN	

Thursday, 9 January 2020		
470-AMT-17 1400 - 1700 hrs	NASA Engineering and Safety Center	Bayhill 23

Thursday, 9 January 2020						
471-AMT-18/PDL-13	Plasma Diagnostics					Bayhill 20
Chaired by: A. SHASHURIN, Purdue University, School of Aeronautics and Astronautics						
1400 hrs AIAA-2020-1743 **Complementary Laser Diagnostics of Metastable $N_2(A^3\Sigma_u^+,v)$ Molecules in Nonequilibrium Plasmas and in High-Speed Flows** E. Jans, I. Gulko, T. Miller, I. Adamovich, Ohio State University, Columbus, OH	1430 hrs AIAA-2020-1744 **Application of a Pulse-Burst Laser for 10 kHz Thomson Scattering** Z. Zhang, C. Smith, University of Tennessee, Knoxville, Knoxville, TN; T. Biewer, Oak Ridge National Laboratory, Oak Ridge, TN; M. Gragston, University of Tennessee, Knoxville, Knoxville, TN; N. Jiang, P. Hsu, Spectral Energies, LLC, Dayton, OH; et al.	1500 hrs AIAA-2020-1745 **Ground-State Atomic Nitrogen Measurements using fs-TALIF in High-Pressure NRP Discharges** C. Dumitrache, A. Gallant, CentraleSupélec, Gif-sur-Yvette, France; N. de Oliveira, Synchrotron Soleil, Saint Aubin, France; G. Stancu, C. Laux, CentraleSupélec, Gif-sur-Yvette, France	1530 hrs AIAA-2020-1746 **Filtered Rayleigh Scattering and Dispersion Filters in between 380 to 420 nm for Atmospheric Temperature Profiling** A. Rekhy, Texas A&M University, College Station, TX; M. Shneider, Princeton University, Princeton, NJ; R. Miles, Texas A&M University, College Station, TX	1600 hrs AIAA-2020-1747 **Two Component Electric Field Dynamics of a ns-SDBD Plasma with Sub-Nanosecond Resolution by Femtosecond EFISH** K. Meehan, A. Starikovskiy, Princeton University, Princeton, NJ; R. Miles, Texas A&M University, College Station, TX		

Thursday, 9 January 2020						
472-APA-35	Advanced Computational Methods for Aerodynamics III					Florida Ballroom B
Chaired by: O. KHAN, Texas A&M University - Kingsville and K. KARA, Oklahoma State University						
1400 hrs AIAA-2020-1748 **A Higher-Order Method Implemented in an Unstructured Panel Code to Model Linearized Supersonic Flows** J. Davis, D. Marshall, California Polytechnic State University, San Luis Obispo, CA	1430 hrs AIAA-2020-1749 **Effects of Spatial Resolution on Retropropulsion Aerodynamics in an Atmospheric Environment** A. Korzun, E. Nielsen, A. Walden, W. Jones, J. Carlson, NASA Langley Research Center, Hampton, VA; P. Moran, NASA Ames Research Center, Moffett Field, CA; et al.					

Thursday, 9 January 2020						
473-APA-39	Special Session: Advances in High-Resolution Numerical Schemes					Florida Ballroom B
Chaired by: O. KHAN, Texas A&M University - Kingsville						
1400 hrs **No Presentation**			1530 hrs AIAA-2020-1750 **Simulation of Acoustic Radiations Over an Open Cavity Using High-Resolution Numerical Scheme** O. Khan, Tuskegee University, Tuskegee, AL; G. Arshed, Papua New Guinea University of Technology, Lae, Papua New Guinea	1600 hrs AIAA-2020-1751 **Comparison of algorithms for simulating multi-component reacting flows using high-order discontinuous Galerkin methods** K. Bando, Stanford University, Stanford, CA; M. Sekachev, Total E&P Research & Technology, Houston, TX; M. Ihme, Stanford University, Stanford, CA	1630 hrs AIAA-2020-1752 **An Enriched Basis Discontinuous Galerkin Method for Shocks and High-Gradient Features in Fluid Mechanics** S. Brill, M. Ihme, Stanford University, Stanford, CA	

Thursday, 9 January 2020						
474-APA-36	**Special Session: CREATE HPC Multiphysics II**					**Barrel Spring II**
Chaired by: N. HARIHARAN, HPCMP CREATE and A. WISSINK, U. S. Army AMRDEC						
1400 hrs Oral Presentation **Physics Based Digital Engineering Decision Support Environment** R. Meakin, CREATE Kestrel Team, Vicksburg, MS	1430 hrs AIAA-2020-1753 **Near- and Far-Field Grid Assessment for Hover Prediction in Engineering Applications** T. Wong, Army Combat Capabilities Development Command, Redstone Arsenal, AL	1500 hrs AIAA-2020-1754 **Personnel Airdrop Extraction Simulations for C-130 H/J** M. Ghoreyshi, U.S. Air Force Academy, Colorado Springs, CO; K. Bergeron, CREATE Kestrel Team, Vicksburg, MS; T. Rose, Army Combat Capabilities Development Command, Natick, MA; A. Jirasek, U.S. Air Force Academy, Colorado Springs, CO; G. Noetscher, Army Combat Capabilities Development Command, Natick, MA	1530 hrs AIAA-2020-1755 **A Study on the Effect of an Experimental Sting on the Wake of a Prolate Spheroid** M. Jemison, K. Delaney, C. Kannepalli, Naval Surface Warfare Center, West Bethesda, MD	1600 hrs Oral Presentation **Antenna System and Platform Design and Analysis using CREATE-RF Tools** M. Gilbert, D. Dault, B. Kramer, L. Griffiths`, A. Pray, J. D'Angelo, Air Force Research Laboratory, Wright-Patterson AFB, OH	1630 hrs AIAA-2020-1756 **Automation Tools for Rotorcraft Analysis on High-Performance Computing Centers** R. Haehnel, Army Corps of Engineers, Hanover, NH; A. Wissink, Army Combat Capabilities Development Command Aviation & Missile Center, Moffett Field, CA; G. George, Army Corps of Engineers, Vicksburg, MS; D. Hardin, J. Fegyveresi, Army Corps of Engineers, Hanover, NH	

Thursday, 9 January 2020						
475-APA-37	**Unsteady Aerodynamics II**					**Coral Spring I**
Chaired by: A. MISHRA, National Institute of Aerospace						
1400 hrs AIAA-2020-1757 **Dynamic Wind Tunnel Testing of Delta-Wing Model without Support Interference** D. Kai, Waseda University, Shinjuku, Japan; H. Sugiura, Japan Aerospace Exploration Agency (JAXA), Chofu, Japan; A. Tezuka, Waseda University, Shinjuku, Japan	1430 hrs AIAA-2020-1758 **Aerodynamic Performance and Trailing Edge Flow Physics on an Airfoil in an Oscillating Freestream** W. Zhu, M. McCrink, J. Bons, J. Gregory, Ohio State University, Columbus, OH	1500 hrs AIAA-2020-1759 **Examination of Pitch-Plunge Equivalence for Dynamic Stall over Swept Finite Wings** D. Garmann, M. Visbal, Air Force Research Laboratory, Wright-Patterson AFB, OH	1530 hrs AIAA-2020-1760 **Frequency Response of a Shuttered Open Jet Wind Tunnel** T. Cook, S. Gunasekaran, University of Dayton, Dayton, OH; M. Ol, Folderol, LLC, Dayton, OH; M. Mongin, University of Dayton, Dayton, OH	1600 hrs AIAA-2020-1761 **Off design simulations of an S-shaped intermediate compressor duct: Experimental validation of DDES and RANS using G3D::Flow** E. Siggeirsson, N. Andersson, Chalmers University of Technology, Gothenburg, Sweden; M. Olander Burak, GKN Aerospace, Trollhattan, Sweden		

Thursday, 9 January 2020						
476-APA-38/MDO-18	**Aerodynamic Design Optimization II**					**Florida Ballroom C**
Chaired by: K. EKICI, University of Tennessee and J. MILGRAM, US Navy						
1400 hrs AIAA-2020-1762 **Aerodynamic Design Optimization of Long Range Projectiles using Missile DATCOM** J. Vasile, J. Bryson, F. Fresconi, Army Research Laboratory, Aberdeen Proving Ground, MD	1430 hrs AIAA-2020-1763 **Optimization of the Thrust to Lift Ratio using Camber Morphing in Flapping Airfoil** P. Soni, A. Bharadwaj S, S. Ghosh, Indian Institute of Technology Madras, Chennai, India	1500 hrs AIAA-2020-1764 **RANS-based aerodynamic shape optimization of a wing considering propeller-wing interaction** S. Chauhan, J. Martins, University of Michigan, Ann Arbor, Ann Arbor, MI	1530 hrs AIAA-2020-1765 **Numerical Morphing of a Rectangular Wing to Prevent Flow Separation** A. Roy, R. Mukherjee, Indian Institute of Technology Madras, Chennai, India			

Thursday, 9 January 2020						
477-AS-6	**Actuation and Control of Adaptive Structures**					**Celebration 4**
Chaired by: M. BALAS, The University of Tennessee Space and M. KHOSHLAHJEH, Joby Aviation						
1400 hrs AIAA-2020-1766 **Design, Fabrication and Testing of an Active Camber Rotor Blade Tip** E. Ferede, F. Gandhi, Rensselaer Polytechnic Institute, Troy, NY	1430 hrs AIAA-2020-1767 **Design, Development and effectiveness of d_{31}–mode and d_{33}–mode multilayered surface bondable piezoelectric actuators for actuation of large and stiff structures** S. P, S. Kumar, G. Srinivasan, Indian Institute of Science, Bengaluru, India	1500 hrs AIAA-2020-1768 **Phase based Control of a Novel Beam-Shape MRE-based Adaptive Tuned Vibration Absorber** A. Rasooli, M. Hemmatian, R. Sedaghati, Concordia University, Montréal, Canada	1530 hrs AIAA-2020-1769 **Biomimetic Adaptive Airframe Technology (BAAT) for Rotorcraft Applications** J. Mabe, M. Allen-Prince, B. Rothacker, The Boeing Company, St. Louis, MO; D. Hartl, M. Benedict, A. Davis, Texas A&M University, College Station, TX; et al.			

Thursday, 9 January 2020

478-EDU-5 — **Advancing Aerospace Education III** — **Silver Spring I**

Chaired by: S. GURURAJAN

1400 hrs	1430 hrs	1500 hrs	1530 hrs	1600 hrs		
AIAA-2020-1770	AIAA-2020-1771	AIAA-2020-1772	AIAA-2020-1773	AIAA-2020-1774		
Concept to Flight Test of an Urban Air Mobility Vehicle in a One-Semester Aircraft Design Course	**Using Small Unmanned Aircraft Systems for Remote Sensing and Data Collection: Aerospace Education and Service Learning**	**Introducing Engineering Students to Industry**	**Sustaining the Aerospace Industry Talent Pipeline through Teacher Externships**	**CD BootCamp: A Unique Approach to Conceptual Design New-Hire Training at Lockheed Martin Skunk Works**		
M. Abdulrahim, University of Missouri Kansas City, Kansas City, MO	N. Macchiarella, K. Adkins, R. Wallace, Embry-Riddle Aeronautical University, Daytona Beach, FL	W. Butler, K. Reid, Virginia Polytechnic Institute and State University, Blacksburg, VA	H. Nieto, K. Buco, Aerojet Rocketdyne, Jupiter, FL	J. Walton, Lockheed Martin Corporation, Palmdale, CA		

Thursday, 9 January 2020

479-EXPL-5 — **Lander/Rovers/Drones** — **Florida Ballroom A**

Chaired by: R. RAMACHANDRAN, Jacobs ESSSA Group

1400 hrs	1430 hrs				
AIAA-2020-1775	**Discussion - Role of Landers/Rovers/Drones in Lunar Surface Operations and Exploration**				
***Astraios*: A New Methodology for Lunar Surface Access System Sizing**	Panelists: Don Krupp, Associate Program Manager, Human Lander Systems, NASA Marshall Space Flight Center Thomas Williams, Capability Enhancements Mgr., Jacobs Renee Weber, Chief Scientist, Human Lander Systems, NASA Marshall Space Flight Center Nikki Werkehiser, Human Lander Systems, NASA Marshall Space Flight Center				
M. Isaji, I. Maynard, B. Chudoba, University of Texas, Arlington, Arlington, TX					

Thursday, 9 January 2020

480-F360-8 — **Forum 360: High Performance Computing's Impact on Aerospace Prediction** — **Regency Ballroom Q**

1400 - 1600 hrs

Moderator: Jeffrey Slotnick, Technical Fellow, Flight Sciences, Boeing Commercial Airplanes

Panelists:

Roy Campbell
Chief Scientist, High Performance Computing Modernization Program
Department of Defense

Douglas Kothe
Director, Exascale Computing Project
Oak Ridge National Laboratory

Scott Morton
DoD HPCMP CREATE-AV Project Manager
U.S. Army Engineering Research and Development Center

Eric Nielson
Senior Research Scientist, Computational AeroSciences Branch
NASA Langley Research Center

Thursday, 9 January 2020

481-FD-67 — **NASA Juncture Flow II** — **Orlando Ballroom M**

Chaired by: C. RUMSEY, NASA-Langley Research Center and H. LEE, NASA-Ames

1400 hrs	1430 hrs	1500 hrs	1530 hrs			
AIAA-2020-1776	AIAA-2020-1777	AIAA-2020-1778	**Juncture Flow Discussion/Wrap-Up**			
Prediction of trailing edge separation on the NASA Juncture Flow using wall-modeled LES (Invited)	**Hybrid Turbulence Model Computations of the NASA Juncture Flow Model Using PHASTA (Invited)**	**Lattice-Boltzmann Very Large Eddy Simulations of the NASA Juncture Flow Model (Invited)**				
A. Lozano-Duran, S. Bose, P. Moin, Stanford University, Stanford, CA	R. Balin, J. Wright, J. Patterson, J. Farnsworth, J. Evans, University of Colorado, Boulder, CO; R. Lakhani, Indian Institute of Technology, Bombay, India; et al.	B. Duda, Dassault Group, Munich, Germany; G. Laskowksi, Dassault Group, Waltham, MA				

Thursday, 9 January 2020

482-FD-68/HSABP-8 — **Experimental Advances and Non-Intrusive Measuring Techniques** — **Plaza Ballroom H**

Chaired by: F. MALO-MOLINA, Raytheon Missile Systems and E. HASSAN, Air Force Research Laboratory

1400 hrs	1430 hrs	1500 hrs	1530 hrs	1600 hrs	1630 hrs	
Oral Presentation	Oral Presentation	Oral Presentation	Oral Presentation	Oral Presentation	Oral Presentation	
Uncovering the Mechanisms of Ignition in Scramjets through the Application of Advanced Diagnostics, Part I of II (Invited)	**Uncovering the Mechanisms of Ignition in Scramjets through the Application of Advanced Diagnostics, Part II of II (Invited)**	**Experimental Investigation of Plasma Ignition and its Processes Applied to High Speed Air-Breathing Propulsion Systems (Invited)**	**Supersonic Combustion Driven by Long Filamentary Plasma (Invited)**	**In-stream measurements of dual-mode scramjet flameholding (Invited)**	**Inlet Isolator and Combustor Physics during Take-Over Regimes of Scramjet Engines (Invited)**	
T. Ombrello, S. Hammack, C. Carter, Air Force Research Laboratory, Wright-Patterson AFB, OH	T. Ombrello, S. Hammack, C. Carter, Air Force Research Laboratory, Wright-Patterson AFB, OH	F. Gomez del Campo, Argonne National Laboratory, Lemont, IL	S. Leonov, University of Notre Dame, Notre Dame, IN	C. Goyne, University of Virginia, Charlottesville, Charlottesville, VA	T. Lee, University of Illinois, Urbana-Champaign, Urbana, IL	

Thursday, 9 January 2020

483-FD-69 — **Bio-Inspired and Low-Reynolds Number Flows III** — **Blue Spring I**

Chaired by: H. DONG, University of Virginia and M. RINGUETTE, University at Buffalo, The State University of New York

1400 hrs	1430 hrs	1500 hrs	1530 hrs	1600 hrs	1630 hrs	
AIAA-2020-1779	AIAA-2020-1780	AIAA-2020-1781	AIAA-2020-1782	AIAA-2020-1783	AIAA-2020-1784	
Effects of Intermittent Swimming Gait in Fish-Like Locomotion	**Aerodynamics and Wing-Wing Interaction during the Pre-Ovipository Flight of the Damselfly**	**Fluid-structure Interaction of Flexible Flapping Wings at High Altitude Conditions**	**A New Expression for Quasi-Steady Effective Angle of Attack Including Airfoil Kinematics and Flow-Field Nonuniformity**	**Examining Undulation andWake Interaction using Statistical Moments in Wake Profile**	**Effect of Airfoil-Preserved Undulations on Wing Performance**	
P. Han, J. Wang, H. Dong, University of Virginia, Charlottesville, Charlottesville, VA	A. Damm, A. Bode-Oke, H. Dong, University of Virginia, Charlottesville, Charlottesville, VA	M. Sridhar, C. Kang, D. Landrum, University of Alabama, Huntsville, Huntsville, AL; H. Aono, Tokyo University of Science, Tokyo, Japan	X. Xu, F. Lagor, State University of New York, Buffalo, NY	G. Loubimov, M. Kinzel, University of Central Florida, Orlando, FL	F. Loughnane, R. Supina, M. Mongin, S. Gunasekaran, University of Dayton, Dayton, OH	

Thursday, 9 January 2020

484-FD-70 — **High Order Finite Volume Methods** — **Rainbow Spring II**

Chaired by: H. NISHIKAWA, National Institute of Aerospace and S. GUZIK, Stephen Guzik

1400 hrs	1430 hrs	1500 hrs	1530 hrs	1600 hrs		
AIAA-2020-1785	AIAA-2020-1786	AIAA-2020-1787	AIAA-2020-1788	AIAA-2020-1789		
High-Order k-Exact Finite Volume Scheme for Vertex-Centered Unstructured Grids	**A Face-Area-Weighted Centroid Formula for Reducing Grid Skewness and Improving Convergence of Edge-Based Solver on Highly-Skewed Simplex Grids**	**Face- and Cell-Averaged Nodal-Gradient Approach to Cell-Centered Finite-Volume Method on Mixed Grids**	**High Order Finite Volume Method for Gas Dynamics on Geometrically HO Unstructured Grids**	**Filtered Density Function for Shocked Compressible Flows on Unstructured Spectral Element Grids**		
F. Setzwein, P. Ess, P. Gerlinger, German Aerospace Center (DLR), Stuttgart, Germany	H. Nishikawa, National Institute of Aerospace, Hampton, VA	H. Nishikawa, National Institute of Aerospace, Hampton, VA; J. White, NASA Langley Research Center, Hampton, VA	J. Le Gouez, ONERA, Châtillon, France	J. Komperda , D. Li, A. Peyvan, F. Mashayek, University of Illinois, Chicago, Chicago, IL		

Thursday, 9 January 2020

485-FD-71 — **Computational Fluid Dynamics Applications I** — **Plaza Ballroom I**

Chaired by: J. BAEDER, University of Maryland and T. EYMANN, Air Force Research Laboratory

1400 hrs	1430 hrs	1500 hrs	1530 hrs			
AIAA-2020-1790	AIAA-2020-1791	AIAA-2020-1792	AIAA-2020-1793			
Ignition Overpressure Analysis of the Orion Launch Abort Motor Ground Test	**CFD Analysis of Micro-Channel Flows for Applications in Environmental Structure Cracking**	**Exergy Analysis of a Decompression Process in a Single Rotating Radial Channel for Power Generation**	**CFD Analysis of a micro rotor in ground effect**			
J. Hall, Lockheed Martin Corporation, Littleton, CO	Y. Pan, W. Zhang, P. Han, L. Brown, X. Deng, J. Burns, University of Virginia, Charlottesville, Charlottesville, VA; et al.	R. Quispe-Abad, N. Müller, Michigan State University, East Lansing, MI	F. Rovere, R. Steijl, G. Barakos, University of Glasgow, Glasgow, United Kingdom			

Thursday, 9 January 2020

486-FD-72	Particle-Laden Flows					Blue Spring II
Chaired by: C. BREHM, University of Kentucky and A. MEDINA, Air Force Research Laboratory						
1400 hrs AIAA-2020-1794 **High-altitude balloon measurements of atmospheric particulates** J. Habeck, J. Flaten, G. Candler, University of Minnesota, Twin Cities, Minneapolis, MN	1430 hrs AIAA-2020-1795 **Fully-Resolved Particulate-Induced Transition Simulations for High-Speed Boundary-Layers with an Immersed Boundary Method** O. Browne, S. Al Hasnine, C. Brehm, University of Kentucky, Lexington, Lexington, KY	1500 hrs AIAA-2020-1796 **Smooth projection kernels for Euler-Lagrange simulations on arbitrary elements computed with discontinuous Galerkin schemes** E. Ching, M. Ihme, Stanford University, Stanford, CA	1530 hrs AIAA-2020-1797 **Analysis of Rocket Jet Particulate using Euler-Lagrange and Euler-Euler Approaches** D. Fontes, D. Mikkelsen, M. Kinzel, University of Central Florida, Orlando, FL	1600 hrs AIAA-2020-1798 **Comparison of numerical simulations of inert particle transport in an electrostatic discharge with experimental results** A. Marayikkottu Vijayan, S. Sawant, D. Levin, University of Illinois, Urbana-Champaign, Urbana, IL; C. Huang, M. Schoenitz, E. Dreizin, NJIT, Newmark, NJ		

Thursday, 9 January 2020

487-FD-73	Other Topics in Fluid Dynamics I					Bayhill 32
Chaired by: S. HOSSEINVERDI, The University of Arizona and S. POROSEVA, The University of New Mexico						
1400 hrs AIAA-2020-1799 **Development of an Anti-Icing Computational Fluid Dynamics Code** D. Maudsley, J. Etele, Carleton University, Ottawa, Canada	1430 hrs AIAA-2020-1800 **New Impeller Shrouds to Improve Hydrodynamic Performance of Centrifugal Pumps: Experimental and Numerical Evaluations** H. Bozorgasareh, Sharif University of Technology, Tehran, Iran; M. Jafari, Iowa State University, Ames, IA; J. Khalesic, University of North Carolina, Charlotte, Charlotte, NC; H. Olah Gazori, Tarbiat Modares University, Tehran, Iran; M. Hassanalian, New Mexico Institute of Mining and Technology, Socorro, NM	1500 hrs AIAA-2020-1801 **Numerical and Experimental Study of Vortex Structure and Energy Loss in a Novel Self-Priming Pump** H. Chang, R. Agarwal, Washington University in St. Louis, St. Louis, MO; W. Li, L. Zhou, W. Shi, Jiangsu University, Zhenjiang, China	1530 hrs AIAA-2020-1802 **Simulation of Flow through Spacer of Bench-Scale Electrodialysis Desalination Stack** B. Estifanos, A. Gross, X. Xu, P. Xu, New Mexico State University, Las Cruces, NM	1600 hrs AIAA-2020-1803 **Investigation of the Interaction Between a Steady Jet and an Impulsively Started Jet Using Schlieren Imaging** K. Natarajan, J. Murugan, National Aerospace Laboratories, Bengaluru, India; S. Sathiyavageeswaran, Indian Space Research Organisation, Sriharikota, India; V. L, National Aerospace Laboratories, Bengaluru, India		

Thursday, 9 January 2020

488-FD-74	Other Topics in Fluid Dynamics II					Rock Spring I & II
Chaired by: S. BENTON, Air Force Research Laboratory and E. DEMAURO, Rutgers, The State University of New Jersey						
1400 hrs AIAA-2020-1804 **Expansion shock wave in Bethe-Zel'dovich-Thompson fluids** J. Zhu, J. Zeng, F. Liu, University of California, Irvine, Irvine, CA	1430 hrs AIAA-2020-1805 **Numerical Study of Shock Interference Patterns for Gas Flows with Thermal Nonequilibrium and Finite-Rate Chemistry** A. Gomes, M. Fossati, University of Strathclyde, Glasgow, United Kingdom; W. Maier, J. Alonso, Stanford University, Stanford, CA; J. Scoggins, École Polytechnique, Paris, France; T. Magin, von Kármán Institute for Fluid Dynamics, Brussels, Belgium; et al.	1500 hrs AIAA-2020-1806 **A Computational Investigation of High Reynolds Number Compressible Boundary Layers** F. Ferguson, D. Feng, Y. Gao, North Carolina A&T State University, Greensboro, NC	1530 hrs AIAA-2020-1807 **Local Laminar Flow Shear and Heat Transfer Solutions for Reduced Order Reentry Simulation** L. DeChant, R. Wagnild, Sandia National Laboratories, Albuquerque, NM	1600 hrs AIAA-2020-1808 **Numerical Model of Jet Impingement and Particle Trajectories in Extraterrestrial Landing Events Using an Euler-Lagrange Method** T. Yeager, D. Fontes, P. Metzger, M. Kinzel, University of Central Florida, Orlando, FL	1630 hrs AIAA-2020-1809 **Methodology to Study the Behavior of Tracer Particles in the Flow Field of Rotor 37 Using CFD Data** D. Kalagotla, P. Orkwis, M. Turner, University of Cincinnati, Cincinnati, OH	

Thursday, 9 January 2020						
489-FD-75	**Turbulent Flows VI**					**Rainbow Spring I**
Chaired by: P. BALAKUMAR, NASA Langley Research Center and J. LARSSON, University of Maryland						
1400 hrs AIAA-2020-1810 **Wall-Modeled LES for Flows over an NACA-0012 Airfoil** P. Balakumar, NASA Langley Research Center, Hampton, VA	1430 hrs AIAA-2020-1811 **Wall-Modeling Strategies for Large-Eddy Simulation of Non-Equilibrium Turbulent Boundary Layers** M. Adler, Stanford University, Stanford, CA; D. Gonzalez, Naval Surface Warfare Center, Indian Head, MD; L. Riley, Air Force Research Laboratory, Wright-Patterson AFB, OH; D. Gaitonde, Ohio State University, Columbus, OH	1500 hrs AIAA-2020-1812 **Characteristic Locations in Shock-Turbulence Interactions** C. Chen, D. Donzis, R. Bowersox, Texas A&M University, College Station, TX				

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490-FD-76	**Flow Control V**					**Plaza Ballroom K**
Chaired by: R. WOSZIDLO, The Boeing Company and M. KOKLU, NASA Langley Research Center						
1400 hrs AIAA-2020-1813 **Data-Driven Reduced Order Control for Partially Observed Fluid Systems** P. Sashittal, D. Bodony, University of Illinois, Urbana-Champaign, Urbana, IL	1430 hrs AIAA-2020-1814 **Design of Active Flow Control Systems and Drivers of Optimal Configurations** N. Hemming, R. Woszidlo, The Boeing Company, Hazelwood, MO	1500 hrs AIAA-2020-1815 **Vortex Structure of a Synthetic Jet Issuing into a Turbulent Boundary Layer from a Finite-span Rectangular Orifice** R. Belanger, D. Zingg, P. Lavoie, University of Toronto, Toronto, Canada	1530 hrs AIAA-2020-1816 **Unsteady Flow Structures Induced by a Single Microsecond Pulsed DBD Plasma Actuator in Quiescent Air** X. Zhang, China Aerodynamics Research and Development Center, Mianyang, China; Y. Cui, J. Tay, B. Khoo, National University of Singapore, Singapore, Singapore	1600 hrs AIAA-2020-1817 **Study for Application of Background Oriented Schlieren Method to Flow Induced by DBD Plasma Actuator** Y. Kaneko, K. Emori, A. Nakano, Tokyo University of Agriculture and Technology, Koganei, Japan; Y. Oshio, Ryukoku University, Otsu, Japan; T. Shimazaki, Y. Tagawa, Tokyo University of Agriculture and Technology, Koganei, Japan; et al.		

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491-FD-77	**Instability and Transition VI**					**Plaza Ballroom J**
Chaired by: S. SCHNEIDER, Purdue University and R. KIMMEL, USAF AFRL/RQHF						
1400 hrs AIAA-2020-1818 **Effects of nose bluntness on hypersonic boundary layer receptivity and stability** H. Goparaju, S. Unnikrishnan, D. Gaitonde, Ohio State University, Columbus, OH	1430 hrs AIAA-2020-1819 **Nonlinear Stability of Straight Cones With Sharp and Blunt Noses at Mach 6** A. Khan, A. Batista, J. Kuehl, University of Delaware, Newark, Newark, DE	1500 hrs AIAA-2020-1820 **Matrix methods for input-output analysis of 2D and 3D hypersonic flows** D. Cook, A. Knutson, J. Nichols, G. Candler, University of Minnesota, Twin Cities, Minneapolis, MN	1530 hrs AIAA-2020-1821 **Effect of Multi-Mode Interaction on Hypersonic Boundary Layer Instability** Y. Uda, M. Takahashi, N. Ohnishi, Tohoku University, Sendai, Japan; H. Tanno, Japan Aerospace Exploration Agency (JAXA), Kakuda, Japan			

Thursday, 9 January 2020						
492-GNC-30/IS-16	**Advances in Adaptive Control for Aerospace Systems V (Invited)**					**Celebration 9**
Chaired by: B. GRUENWALD, U. S. Army Research Laboratory (APG) and A. KORU						
1400 hrs AIAA-2020-1822 **Adaptive Control for a Guided Projectile using an Expanded Reference Model (Invited)** B. Gruenwald, J. Bryson, Army Research Laboratory, Aberdeen Proving Ground, MD	1430 hrs AIAA-2020-1823 **Approximate Optimal Orbit Transfer of Non-cooperative Debris (Invited)** M. Greene, C. Riano-Rios, R. Bevilacqua, N. Fitz-Coy, W. Dixon, University of Florida, Gainesville, Gainesville, FL	1500 hrs AIAA-2020-1824 **Adaptive Consensus Control of Rigid Body Attitude Motion Based on Rotation Matrices (Invited)** A. Koru, Pennsylvania State University, State College, PA; M. Maadani, University of Arizona, Tucson, Tucson, AZ; S. Sarsilmaz, University of South Florida, Tampa, FL; E. Johnson, Pennsylvania State University, State College, PA; E. Butcher, University of Arizona, Tucson, Tucson, AZ; T. Yucelen, University of South Florida, Tampa, FL				

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493-GNC-31	Aircraft Energy Management and Control					Bayhill 17
Chaired by: M. NIESTROY, Lockheed Martin Corporation and B. CHANDRASEKARAN						
1400 hrs AIAA-2020-1825 **Flight Endurance Enhancement Via Thermal Management System Control Subject To Multiple Limitations** D. Sigthorsson, Infoscitex Corporation, Dayton, OH; M. Oppenheimer, D. Doman, Air Force Research Laboratory, Wright-Patterson AFB, OH	1430 hrs AIAA-2020-1826 **Optimal Force and Energy Management of Dynamic Soaring in Different Reference Frames** G. Sachs, Technical University of Munich, Munich, Germany	1500 hrs AIAA-2020-1827 **Online Rendezvous Guidance for Helicopter Using State Dependent Riccati Equation** O. Halbe, M. Hajek, Technical University of Munich, Garching, Germany	1530 hrs AIAA-2020-1828 **Robust Helicopter Sliding Mode Control for Enhanced Handling and Trajectory Following** O. Halbe, M. Hajek, Technical University of Munich, Garching, Germany	1600 hrs AIAA-2020-1829 **Nonlinear Model Predictive Real-time Control of Aircraft in Collision Avoidance** Y. Shimizu, University of Tokyo, Tokyo, Japan		

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494-GNC-32	Helicopter and Multirotor Vehicle Control					Bayhill 31
Chaired by: J. STECK, Wichita State University and G. TALLANT, Lockheed Martin Aeronautics						
1400 hrs AIAA-2020-1830 **Explicit Reference Governor for Constrained Maneuver and Shape Control of a Seven-State Multibody Aircraft** I. O'Rourke, I. Kolmanovsky, University of Michigan, Ann Arbor, Ann Arbor, MI; E. Garone, Université Libre de Bruxelles, Bruxelles, Belgium; A. Girard, University of Michigan, Ann Arbor, Ann Arbor, MI	1430 hrs AIAA-2020-1831 **Development and Simulation of Damage Tolerant Control Laws for a Compound Helicopter** M. Knapp, San Jose State University, Moffett Field, CA; C. Ivler, University of Portland, Portland, OR; J. Horn, E. Johnson, Pennsylvania State University, University Park, PA; D. Bridges, Piasecki Aircraft Corporation, Essington, PA; M. Lopez, Army Combat Capabilities Development Command Aviation & Missile Center, Moffett Field, CA; et al.	1500 hrs AIAA-2020-1832 **Control of Large Multicopters with Rate-Limited Electric Motors** M. Welsch, W. Fichter, University of Stuttgart, Stuttgart, Germany	1530 hrs AIAA-2020-1833 **Active Battery Charge Drift Stabilization for Redundant Multirotors** J. Stephan, W. Fichter, University of Stuttgart, Stuttgart, Germany	1600 hrs AIAA-2020-1834 **Robust H-infinity Control for a Bi-rotor System** R. Hassan, A. Hossam, A. El-Badawy, German University in Cairo, Cairo, Egypt	1630 hrs AIAA-2020-1835 **System Identification and Model-Based Flight Control System Design for an Agile Maneuvering Quadrotor Platform** B. Yuksek, E. Saldiran, A. Cetin, R. Yeniceri, Istanbul Technical University, Istanbul, Turkey; G. Inalhan, Cranfield University, Cranfield, United Kingdom	

Thursday, 9 January 2020

495-GNC-33	Navigation, Estimation, Sensing, and Tracking IV					Bayhill 33
Chaired by: J. BERTRAM						
1400 hrs AIAA-2020-1836 **Output Feedback Control for Lift Maximization of a Pitching Airfoil** J. Lidard, D. Goswami, D. Snyder, G. Sedky, A. Jones, D. Paley, University of Maryland, College Park, College Park, MD	1430 hrs AIAA-2020-1837 **Autonomous Navigation Using Novel Sources at Jupiter** K. Danas Rivera, M. Peck, Cornell University, Ithaca, NY	1500 hrs AIAA-2020-1838 **Deep Learning Crater Detection for Lunar Terrain Relative Navigation** L. Downes, Massachusetts Institute of Technology, Cambridge, MA; T. Steiner, Draper Laboratory, Cambridge, MA; J. How, Massachusetts Institute of Technology, Cambridge, MA	1530 hrs AIAA-2020-1839 **Multi-Agent Autonomous Operations in Urban Air Mobility with Communication Constraints** X. Yang, J. Liu, P. Wei, Iowa State University, Ames, IA; H. Li, University of Tennessee, Knoxville, Knoxville, TN			

Thursday, 9 January 2020

496-GT-8 1400 - 1700 hrs	Transforming Ground and Flight Testing Through Digital Engineering	Plaza Ballroom E

Panelists:

Eileen Bjorkman
Executive Director
Air Force Test Center

John Dong
Boeing Executive and Senior Technical Fellow, Chair of Digital Enterprise Technical Council
The Boeing Company

Gary Honea
Product Line Test Architect
Raytheon Missile Systems

Don Kinard
Senior Technical Fellow, F-35 Production
Lockheed Martin Aeronautics Company

Ryan Norman
Test Resource Management Center

Thursday, 9 January 2020

497-GTE-11/PC-23 1400 - 1700 hrs	Future Needs for Gas Turbine Engines	Bayhill 21

The National Academies of Sciences, Engineering, and Medicine convened a study committee to identify high-priority opportunities for improving and creating advanced technologies that can be introduced into the design and manufacture of gas turbine engines. In particular, the committee was tasked to determine ways to enhance the performance of as turbines, particularly with respect to efficiency and life cycle cost, by 2030. The committee recommended high-priority goals as well as research areas and topics that would most effectively achieve those goals. This panel will provide the outcomes of the study.

Panelists:

Sean Bradshaw
Pratt & Whitney

Michael Foust
General Electric

John Gulen
Bechtel Corporation

Thursday, 9 January 2020

498-GTE-12 1400 - 1600 hrs	Gas Turbine Applications for Hypersonic Vehicles	Manatee Spring II

The format of this panel discussion will be 10-15 minutes presentation by each panelist followed by Q&A. Gas turbine technology is very critical for hypersonic propulsion. Technology advancements from gas turbine field can be applied readily to the development of hypersonic vehicles, however there are also additional challenges in adopting them. The topic area for the panel is very broad. The idea is to have 4-5 panelists talk about recent advancements and future directions, followed by Q&A.

Confirmed panelists include leading hypersonic researchers and program managers from industry, DoD, and NASA.

Thursday, 9 January 2020

499-HIS-3 1400 - 1700 hrs	Capturing Vital Lessons From Successes and Failures in Aircraft Design	Bayhill 22

This panel is part of a lecture series on meeting the technical, political, and managerial challenges involved in bringing new aircraft into being and service.

Moderator: Lee Nicolai, Lockheed Martin Corporation

Panelists:

TFX/F-111
Lee Nicolai
U.S. Air Force and Lockheed Martin Corporation

Convair B-58
Kevin Renshaw
Lockheed Martin Aeronautics Systems Company

Cessna 172
David Levy
Sierra Nevada Corporation

Thursday, 9 January 2020

500-HSABP-9/PC-24	High-Speed Combustion II					Plaza Ballroom G

Chaired by: J. AUSTIN, California Institute of Technology and K. BOWCUTT, Boeing

1400 hrs Oral Presentation **Concept of plasma assisted injector and application to supersonic combustion** A. Vincent-Randonnier, B. Rouxel, C. Lecointe, P. Roux, ONERA, Palaiseau, France	1430 hrs AIAA-2020-1841 **Flame stabilization in high stagnation temperature supersonic flows: experiments and simulations** N. Thakor, C. Miranda, S. Chaudhuri, Indian Institute of Science, Bengaluru, India	1500 hrs AIAA-2020-1842 **Investigations of mixed conventional and MILD combustion flames** V. Narayanaswamy, A. Sahoo, K. Lyons, North Carolina State University, Raleigh, NC; R. Johnson, Naval Research Laboratory, Washington, D.C.	1530 hrs AIAA-2020-1843 **Simulations of Turbulent Combustion for a Jet-fueled Cavity Adjacent to a Supersonic Arc-heated Flow** E. Cisneros-Garibay, D. Buchta, J. Freund, University of Illinois, Urbana-Champaign, Urbana, IL			

Thursday, 9 January 2020

501-IS-17	Adaptive and Intelligent Control Systems II					Celebration 10

Chaired by: N. NEOGI, NASA Langley Research Center and J. VALASEK, Texas A&M University

1400 hrs AIAA-2020-1844 **Online Adaptive Incremental Reinforcement Learning Flight Control for a CS-25 Class Aircraft** S. Heyer, D. Kroezen, E. Van Kampen, Delft University of Technology, Delft, The Netherlands	1430 hrs AIAA-2020-1845 **Adaptive Critic Control For Aircraft Lateral-Directional Dynamics** I. Ashraf, E. Van Kampen, Delft University of Technology, Delft, The Netherlands	1500 hrs AIAA-2020-1846 **Design and evaluation of advanced intelligent flight controllers** D. Milz, G. Looye, German Aerospace Center (DLR), Wessling, Germany	1530 hrs AIAA-2020-1847 **Design of Virtual Controllers for Systems with Hard Constraints** A. Alhajjar, Michigan State University, East Lansing, MI; S. Swei, NASA Ames Research Center, Moffett Field, CA; G. Zhu, Michigan State University, East Lansing, MI	1600 hrs AIAA-2020-1848 **Learning How to Soar: Steady State Autonomous Dynamic Soaring Through Reinforcement Learning** C. Montella, Lehigh University, Bethlehem, PA	1630 hrs AIAA-2020-1849 **Design of a Reinforcement Learning based Controller for Gliding Control of an Experimental Design Vehicle** A. Din, Air University, Islamabad, Pakistan; S. Janujua, National University of Sciences and Technology, Islamabad, Pakistan; A. Maqsood, M. Habib, Air University, Islamabad, Pakistan	

Thursday, 9 January 2020						
502-IS-18	**Learning Reasoning and Data Driven Systems II**					**Celebration 11**
Chaired by: A. YUCEL, Lockheed Martin Aeronautics and Y. WAN, University of Texas, Arlington						
1400 hrs AIAA-2020-1850 **Application of Machine Learning Techniques to Parameter Selection for Flight Risk Identification** E. Mangortey, D. Monteiro, J. Ackley, Z. Gao, T. Puranik, M. Kirby, Georgia Institute of Technology, Atlanta, GA; et al.	1430 hrs AIAA-2020-1851 **An Application of DBSCAN Clustering for Flight Anomaly Detection During the Approach Phase** K. Sheridan, T. Puranik, E. Mangortey, O. Pinon-Fischer, M. Kirby, D. Mavris, Georgia Institute of Technology, Atlanta, GA	1500 hrs AIAA-2020-1852 **Classification of Intermediate Range Missiles During Launch** J. Eckert, M. Carpenter, R. Hartfield, N. Cervantes, Auburn University, Auburn, AL	1530 hrs AIAA-2020-1853 **Conditional Generative Adversarial Networks (CGAN) for Aircraft Trajectory Prediction considering weather effects** Y. Pang, Y. Liu, Arizona State University, Tempe, AZ			

Thursday, 9 January 2020						
503-MAT-12	**Testing and Characterization**					**Celebration 13**
Chaired by: R. NAIK, Pratt & Whitney and E. PINEDA, NASA Glenn Research Ctr						
1400 hrs AIAA-2020-1854 **Review of Sensing Techniques of Ablative Materials** C. Yang, J. Koo, University of Texas, Austin, Austin, TX	1430 hrs AIAA-2020-1855 **Aerothermal Testing of Ablatives for Material Performance** Y. Zhao, B. Chen, J. Koo, University of Texas, Austin, Austin, TX	1500 hrs AIAA-2020-1856 **Effects of Environment and Geometry on the Coupon-level Testing Procedures for Composite Rotor Blade Retirement Time** C. Lee, D. Gong, S. Shin, Seoul National University, Seoul, South Korea	1530 hrs AIAA-2020-1857 **Weak Bond Evaluation of Airframe Epoxy Adhesives in Saltwater Mist Contamination** T. Morimoto, Japan Aerospace Exploration Agency (JAXA), Mitaka, Japan; A. Fujimoto, Amil Corporation, Urayasu, Japan; H. Katoh, H. Kumazawa, Japan Aerospace Exploration Agency (JAXA), Mitaka, Japan	1600 hrs AIAA-2020-1858 **Microstructural Quantification and Virtual Reconstruction of Polymer Matrix Composites** S. Shah, M. Schey, J. Hu, F. Liu, T. Beke, S. Stapleton, University of Massachusetts, Lowell, Lowell, MA; et al.		

Thursday, 9 January 2020						
504-MAT-13/STR-14	**Applications of Artificial Intelligence and Machine Learning to Problems in Structures and Materials II**					**Celebration 6**
Chaired by: J. DUSTIN and J. DUSTIN and S. ARNOLD, NASA Glenn Research Center						
1400 hrs AIAA-2020-1859 **Data-Driven and Reduced-Order Modeling of Composite Drilling** J. Xiao, N. Liu, J. Lua, Global Engineering and Materials, Inc., Princeton, CT; C. Saathoff, W. Seneviratne, Wichita State University, Wichita, KS	1430 hrs AIAA-2020-1860 **Physics-based Deep Learning for Probabilistic Fracture Analysis of Composite Materials** Y. Gao, H. Yao, H. Wei, Y. Liu, Arizona State University, Tempe, AZ	1500 hrs AIAA-2020-1861 **Development of Artificial Neural Network Potential for Graphene** A. Singh, X. Chen, Y. Li, S. Koric, E. Guleryuz, University of Illinois, Urbana-Champaign, Urbana, IL	1530 hrs AIAA-2020-1862 **Comprehensive Piezoelectric Material Application Issues on Energy Harvesting for Artificial Intelligence Systems** M. Shabara, T. Xu, Old Dominion University, Norfolk, VA	1600 hrs AIAA-2020-1863 **Multiscale Analysis of Composites Using Surrogate Modeling and Information Optimal Designs** S. Arnold, NASA Glenn Research Center, Cleveland, OH; M. Piekenbrock, Wright State University, Dayton, OH; T. Ricks, J. Stuckner, NASA Glenn Research Center, Cleveland, OH		

Thursday, 9 January 2020						
505-MDO-19	**Metamodeling and Approximation Methods in Design**					**Celebration 2**
Chaired by: S. FERGUSON, North Carolina State University and L. LEIFSSON, Iowa State University						
1400 hrs AIAA-2020-1864 **Satellite Image Classification and Segmentation with Transfer Learning** R. Giorgiani do Nascimento, F. Viana, University of Central Florida, Orlando, FL	1430 hrs AIAA-2020-1865 **Gradient-Enhanced Universal Kriging with Polynomial Chaos as Trend Function** L. Zuhal, K. Zakaria, P. Palar, Bandung Institute of Technology, Bandung, Indonesia; K. Shimoyama, Tohoku University, Sendai, Japan; R. Liem, Hong Kong University of Science and Technology, Hong Kong, Hong Kong	1500 hrs AIAA-2020-1866 **Complex Nozzle Optimization Techniques using Machine Learning** D. DiDominic, E. Gist, J. Fitzgerald, M. Glauser, Syracuse University, Syracuse, NY	1530 hrs AIAA-2020-1867 **On the Impact of Covariance Functions in Multi-Objective Bayesian Optimization for Engineering Design** P. Palar, L. Zuhal, Bandung Institute of Technology, Bandung, Japan; T. Chugh, University of Exeter, Exeter, United Kingdom; A. Rahat, University of Plymouth, Plymouth, United Kingdom	1600 hrs AIAA-2020-1868 **Dimensionality Extension of Surrogate Models** M. Walter, Georgia Institute of Technology, Atlanta, GA		

Thursday, 9 January 2020						
506-MST-13	**Modeling and Simulation for Guidance and Navigation**					**Coral Spring II**
Chaired by: U. DURAK, DLR-German Aerospace Center and D. POOL, Delft University of Technology						
1400 hrs AIAA-2020-1869 **On Neural Network Training from Noisy Data using a Novel Filtering Framework** V. Deshpande, N. Das, V. Tadiparthi, R. Bhattacharya, Texas A&M University, College Station, TX	1430 hrs AIAA-2020-1870 **Helicopter Collision Avoidance Algorithm for Automatic Hovering** A. Shimizu, K. Funabiki, H. Ishii, Japan Aerospace Exploration Agency (JAXA), Tokyo, Japan	1500 hrs AIAA-2020-1871 **A Study on Improved Modified Navigation against Noise and Time Lag for a Missile Guidance** Y. Shiraishi, H. Takano, T. Yamasaki, I. Yamaguchi, National Defense Academy, Yokosuka, Japan	1530 hrs AIAA-2020-1872 **Uncertain Autopilot Lag-Compensated Intercept Guidance for Integrated Guidance and Autopilot** Y. Shiraishi, T. Yamasaki, National Defense Academy, Yokosuka, Japan			

Thursday, 9 January 2020						
507-MST-14	**Visual Systems and Image Processing**					**Bayhill 30**
Chaired by: J. SCHROEDER, Federal Aviation Administration and M. RASSAIAN, RASSAIAN, LLC						
1400 hrs AIAA-2020-1873 **Reconstruction of Pilot Behaviour from Cockpit Image Recorder** H. Tsuda, Japan Aerospace Exploration Agency (JAXA), Tokyo, Japan; O. Stroosma, M. Mulder, Delft University of Technology, Delft, The Netherlands	1430 hrs AIAA-2020-1874 **Pose Estimation of Uncooperative Spacecraft from Monocular Images Using Neural Network Based Keypoints** A. Harvard, V. Capuano, E. Shao, S. Chung, California Institute of Technology, Pasadena, CA	1500 hrs AIAA-2020-1875 **An Outside-View System for Aircraft Cabin Human-in-the-Loop Simulations** S. Kocks, M. Kallenbach, I. Voissel, T. Feuerle, Technical University of Braunschweig, Braunschweig, Germany				

Thursday, 9 January 2020						
508-NDA-15	**Uncertainty Quantification and Management III**					**Celebration 3**
Chaired by: X. HUAN, University of Michigan, Ann Arbor and E. WALKER, NASA Langley Research Center						
1400 hrs AIAA-2020-1876 **Non-Intrusive Uncertainty Quantification Method for Flows with Discontinuity** T. Inoue, K. Miyaji, Yokohama National University, Yokohama, Japan	1430 hrs AIAA-2020-1877 **Efficient Bayesian Inverse Method Using Robust Gaussian Processes For Design Under Uncertainty** S. Ghosh, P. Pandita, W. Subber, Y. Zhang, L. Wang, General Electric Company, Niskayuna, NY	1500 hrs AIAA-2020-1878 **Toward an Uncertain Modeling of Hypersonic Aerodynamic Forces** P. Sharma, X. Wang, M. Mignolet, Arizona State University, Tempe, AZ				

Thursday, 9 January 2020						
509-PC-25	**Combustion - Blowout and Relight**					**Bayhill 25**
Chaired by: A. CASWELL, USAF AFRL/RQTC and S. YANG, University of Minnesota						
1400 hrs AIAA-2020-1879 **Flame Extinction and Re-Ignition in a Swirl Stabilized Prevaporized Liquid Fuel Flame Close to Lean Blow-Out** C. Arndt, German Aerospace Center (DLR), Stuttgart, Germany; A. Steinberg, Georgia Institute of Technology, Atlanta, GA; W. Meier, German Aerospace Center (DLR), Stuttgart, Germany	1430 hrs AIAA-2020-1880 **Thermoacoustic Instabilities in a Three Bluff Body Flow** A. Tomlin, C. Fugger, A. Caswell, Air Force Research Laboratory, Wright-Patterson AFB, OH	1500 hrs AIAA-2020-1881 **Insights of Bluff-Body Extinction and Blowout from 4D Measurements** A. Morales, C. Rising, J. Reyes, K. Ahmed, University of Central Florida, Orlando, FL; D. Knaus, D. Micka, Creare, Inc., Hanover, NH	1530 hrs AIAA-2020-1882 **Fuel Effects on Altitude Relight Performance of a Swirl Cup Combustor** S. Stouffer, T. Hendershott, J. Colborn, J. Monfort, University of Dayton, Dayton, OH; E. Corporan, P. Wrzesinski, Air Force Research Laboratory, Wright-Patterson AFB, OH; et al.	1600 hrs AIAA-2020-1883 **Fuel and Operating Condition Effects on Lean Blowout in a Swirl-Stabilized Single-Cup Combustor** J. Colborn, J. Heyne, University of Dayton, Dayton, OH; T. Hendershott, S. Stouffer, University of Dayton Research Institute, Dayton, OH; E. Peiffer, Oregon State University, Corvallis, OR; E. Corporan, Air Force Research Laboratory, Wright-Patterson AFB, OH		

Thursday, 9 January 2020

510-PDL-14 — **Plasma Aerodynamics** — **Barrel Spring I**

Chaired by: C. LIMBACH, Texas A&M University and D. ASHPIS, NASA Glenn Research Center

1400 hrs
AIAA-2020-1884
Supersonic Cavity Flow Control by Upstream Filamentary Plasma
A. Houpt, S. Leonov, University of Notre Dame, Notre Dame, IN; T. Ombrello, C. Carter, Air Force Research Laboratory, Wright-Patterson AFB, OH

1430 hrs
AIAA-2020-1885
Study of cooling and the effect of energy deposited in a single nanosecond spark plasma discharge using simultaneous 50 kHz PIV and BOS
B. Singh, L. Rajendran, P. Vlachos, S. Bane, Purdue University, West Lafayette, IN

1500 hrs
AIAA-2020-1886
An Experimental Validation of a Revised Paschen's Law Relating to the ESD of Aerospace Vehicle Surfaces
A. Woodard, M. Morales, J. Sosa, K. Ahmed, University of Central Florida, Orlando, FL; M. Johansen, J. Wilson, NASA Kennedy Space Center, Cape Canaveral, FL; et al.

1530 hrs
AIAA-2020-1887
Controlled Electric Charging of an Aircraft in Flight using Corona Discharge
C. Guerra-Garcia, Massachusetts Institute of Technology, Cambridge, MA; P. Fontanes, M. Urbani, J. Montanya, Technical University of Catalonia, Terrassa, Spain; T. Mouratidis, M. Martinez-Sanchez, Massachusetts Institute of Technology, Cambridge, MA; et al.

1600 hrs
AIAA-2020-1888
Thermal Plasma Sheaths in Hypersonic Boundary Layers: A Preliminary Numerical Study
B. Parent, V. Tsakagiannis, University of Arizona, Tucson, Tucson, AZ; V. Nguyen, Pusan National University, Busan, South Korea

1630 hrs
AIAA-2020-1889
Q-DC Plasma Actuation for Mach-4 Supersonic Flow Control over Compression Ramp
Y. Watanabe, University of Notre Dame & University of Tokyo, Notre Dame, IN; S. Elliott, A. Houpt, S. Leonov, University of Notre Dame, Notre Dame, IN

Thursday, 9 January 2020

511-PDL-15 — **Plasma Assisted Combustion II** — **Bayhill 26**

Chaired by: A. YALIN, Colorado State University

1400 hrs
AIAA-2020-1890
Plasma assisted ignition of ethylene–air mixtures by ns discharge behind reflected shock wave: role of molecular nitrogen
A. Starikovskiy, Princeton University, Princeton, NJ

1430 hrs
AIAA-2020-1891
Laser-Induced Breakdown Ignition of Low-Pressure Hydrogen-Air Premixtures
P. Popov, M. Nishihara, A. Munafò, J. Macart, G. Elliott, J. Freund, University of Illinois, Urbana-Champaign, Urbana, IL

1500 hrs
AIAA-2020-1892
Modeling of laser ignition in hydrogen-air mixture
A. Tropina, Texas A&M University, College Station, TX; M. Shneider, Princeton University, Princeton, NJ

1530 hrs
AIAA-2020-1893
Single and Dual-Pulse Laser Ignition of Methane-Air and Hydrogen-Air Mixtures
C. Butte, P. Lokini, Colorado State University, Fort Collins, CO; C. Dumitrache, CentraleSupélec, Châtenay-Malabry, France; A. Yalin, Colorado State University, Fort Collins, CO

1600 hrs
AIAA-2020-1894
Influence of moderate pressure nanosecond discharge on the structure of detonation wave
M. Ali Cherif, École Polytechnique, Palaiseau, France; A. Claverie, P. Vidal, National Center for Scientific Research (CNRS), Chasseneuil, France; S. Starikovskaia, S. Shcherbanev, École Polytechnique, Palaiseau, France

1630 hrs
AIAA-2020-1895
Electric Ignition Characteristics of an Ammonium-Dinitramide-Based Ionic Liquid Monopropellant with Discharge Plasma
A. Wada, H. Habu, Japan Aerospace Exploration Agency (JAXA), Sagamihara, Japan

Thursday, 9 January 2020

512-PGC-10 — **Fundamentals of Detonations and Compressible Turbulent Combustion** — **Manatee Spring I**

1400 - 1700 hrs

Thursday, 9 January 2020

513-SCS-8 — **Spacecraft Structures Test, Analysis, and Correlation/ Membrane and Soft Goods Mechanics** — **Celebration 12**

Chaired by: G. GRESCHIK, TentGuild Engineering Co and J. SAUDER, Jet Propulsion Laboratory

1400 hrs
AIAA-2020-1896
Parasitic Torque Characterization of Wire Harness Across Hinge Line of CubeSat Deployable Solar Arrays
C. Peter, MMA Design, LLC, Louisville, CO

1430 hrs
AIAA-2020-1897
Origami-based TPS Folding Concept for Deployable Mars Entry Vehicles
D. O'Driscoll, M. Santer, P. Bruce, Imperial College London, London, United Kingdom

1500 hrs
AIAA-2020-1898
Acoustic Analysis and Test Correlation of Direct Field Acoustic Test Configuration
B. Blevins, D. Inoyama, R. Agarwal, T. Stoumbos, Northrop Grumman Corporation, Dulles, VA; R. Kapania, Virginia Polytechnic Institute and State University, Blacksburg, VA

1530 hrs
AIAA-2020-1899
Bending Stiffness Estimation of Creased Textile Membrane for Space Structure Design
B. Hohmann, H. Sakamoto, Tokyo Institute of Technology, Tokyo, Japan

1600 hrs
AIAA-2020-1900
Visco-Elasto-Plastic Behavior of Creased Space Membrane
Y. Satou, Japan Aerospace Exploration Agency (JAXA), Sagamihara, Japan; H. Furuya, Tokyo Institute of Technology, Yokohama, Japan; K. Shoko, T. Miyashita, Waseda University, Tokyo, Japan

Thursday, 9 January 2020

514-SD-16 — **Experimental Structural Dynamics** — **Celebration 1**

Chaired by: T. KINNEY, NASA and E. STEWART, NASA Marshall Space Flight Center

1400 hrs
AIAA-2020-1901
Multiple Shaker Placement for Ground Vibration Test of X-59 Aircraft using Topology Optimization
C. Pak, NASA Armstrong Flight Research Center, Edwards, CA

1430 hrs
AIAA-2020-1902
Ground Vibration Testing on Very Flexible Aircraft
B. Sharqi, C. Cesnik, University of Michigan, Ann Arbor, Ann Arbor, MI

1500 hrs
AIAA-2020-1903
Inverse Methods for Identifying Pressure Loading Vehicles using Structural Response
P. Coffin, C. Dennard, J. Pham, Sandia National Laboratories, Albuquerque, NM

1530 hrs
AIAA-2020-1904
On the Operational Modal Analysis Techniques for the estimate of modal parameters of aircraft structures during flying vibration tests
J. Covioli, G. Coppotelli, University of Rome "La Sapienza", Rome, Italy

1600 hrs
AIAA-2020-1905
On the Operational Modal Analysis applied to linear time periodical systems
G. Coppotelli, M. Deon, University of Rome "La Sapienza", Rome, Italy; I. Santos, Denmark Technical University, Lyngby, Denmark

Thursday, 9 January 2020

515-SD-17	Aeroelasticity: Limit Cycle Oscillations					Celebration 15
Chaired by: A. GREWAL, National Research Council Canada and C. RISO, University of Michigan, Ann Arbor						
1400 hrs AIAA-2020-1906 **ZEUS Application for F-16 Limit-Cycle-Oscillation Prediction** R. Cheng, R. Spinetti, J. Dubben, S. Kernazhitskiy, Air Force SEEK EAGLE Office, Eglin AFB, FL	1430 hrs AIAA-2020-1907 **Limit cycle oscillations of cantilever rectangular designed using Topology Optimisation** D. Munk, Defence Science and Technology, Melbourne, Australia; D. Dooner, G. Vio, N. Giannelis, A. Murray, University of Sydney, Sydney, Australia; G. Dimitriadis, University of Liege, Liege, Belgium	1500 hrs AIAA-2020-1908 **Aeroelastic Testing for Freeplay induced Limit Cycles of Flexible Wing-aileron System** X. He, Z. Song, Northwestern Polytechnical University, Xi'an, China; Z. Wu, F. Liu, Beihang University, Beijing, China				

Thursday, 9 January 2020

516-SFM-22	Artificial Intelligence in Space Flight Mechanics II					Bayhill 27
Chaired by: D. SPENCER, The Pennsylvania State University						
1400 hrs AIAA-2020-1909 **Deep Reinforcement Learning approach for Small Bodies Shape Reconstruction Enhancement** M. Piccinin, M. Lavagna, Technical University of Milan, Milan, Italy	1430 hrs AIAA-2020-1910 **Image-based Deep Reinforcement Learning for Autonomous Lunar Landing** A. Scorsoglio, R. Furfaro, University of Arizona, Tucson, Tucson, AZ; R. Linares, Massachusetts Institute of Technology, Cambridge, MA; B. Gaudet, University of Arizona, Tucson, Tucson, AZ	1500 hrs AIAA-2020-1911 **A Comparison of Parametric and Non-Parametric Machine Learning Approaches for the Uncertain Lambert Problem** D. Gueho, P. Singla, R. Melton, D. Schwab, Pennsylvania State University, University Park, PA	1530 hrs AIAA-2020-1912 **Apprenticeship Learning for Maneuver Design in Multi-Body Systems** I. Elliott, N. Bosanac, N. Ahmed, J. McMahon, University of Colorado, Boulder, Boulder, CO	1600 hrs AIAA-2020-1913 **Markov Chain Monte Carlo Extensions to Gaussian Processes Approach on Orbit Predictions** H. Peng, X. Bai, Rutgers University, Piscataway, NJ	1630 hrs AIAA-2020-1914 **Using Reinforcement Learning to Design a Low-Thrust Approach into a Periodic Orbit in a Multi-Body System** C. Sullivan, N. Bosanac, University of Colorado, Boulder, Boulder, CO	

Thursday, 9 January 2020

517-SFM-23	Rendezvous, Relative Motion, Proximity Missions, and Formation Flying III					Bayhill 28
Chaired by: R. FURFARO, University of Arizona						
1400 hrs AIAA-2020-1915 **A Unified Approach for the Optimal Constellation Design of Satellites in Low-Earth Circular/Elliptical Orbits for Continuous Coverage** G. Aggarwal, California Institute of Technology, Pasadena, CA; R. R V, Indian Institute of Space Science and Technology, Thiruvananthapuram, India	1430 hrs AIAA-2020-1916 **Using Genetic Algorithms for Safe Swarm Trajectory Optimization** R. Rughani, D. Barnhart, University of Southern California, Los Angeles, CA	1500 hrs AIAA-2020-1917 **Distributed Unscented-Information Kalman Filter (UIKF) for Cooperative Localization in Spacecraft Formation Flying** H. Kaptui Sipowa, J. McMahon, T. Deka, University of Colorado, Boulder, Boulder, CO	1530 hrs AIAA-2020-1918 **Spacecraft Formation Relative Trajectories Identification for Collision-Free Maneuvers using Neural-Reconstructed Dynamics** S. Silvestrini, M. Lavagna, Technical University of Milan, Milan, Italy	1600 hrs AIAA-2020-1919 **Kinematic and Dynamic Spacecraft Maneuver Simulators for Verification and Validation of Space Robotic Systems** M. Wilde, Florida Institute of Technology, Melbourne, FL; S. Kwok Choon, M. Romano, Naval Postgraduate School, Monterey, CA		

Thursday, 9 January 2020

518-SFM-24	Space Trajectory Design and Optimization IV					Bayhill 29
Chaired by: T. HENDERSON						
1400 hrs AIAA-2020-1920 **MORPHEUS: A Multi-Spacecraft Architecture for the Uranus System Grand Tour** B. D'Andrea, A. Brandonisio, M. Indaco, M. Lavagna, Technical University of Milan, Milan, Italy	1430 hrs AIAA-2020-1921 **Mission and Trajectory Design Considerations for a Human Lunar Mission Originating from a Near Rectilinear Halo Orbit** G. Condon, NASA Johnson Space Center, Houston, TX; C. Ocampo, Odyssey Space Research, LLC, Houston, TX; L. Burke, C. Esty, C. Berry, NASA Johnson Space Center, Houston, TX; B. Mahajan, Odyssey Space Research, LLC, Houston, TX; et al.	1500 hrs AIAA-2020-1922 **ELEET- Formulating a Multi-Element, inter-agency Error Budget for Robust Earth Entry of Returned Mars Samples** A. Didion, A. Tompkins, A. Nicholas, M. Lobbia, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA	1530 hrs AIAA-2020-1923 **Survey of Methods for Calculating Impulsive ΔV-Minimizing Orbit Transfer Maneuvers** M. Walsh, M. Peck, Cornell University, Ithaca, NY			

Thursday, 9 January 2020						
519-STR-15	**Design, Analysis, and Certification of Additive Structures II**					**Celebration 14**
Chaired by: M. ROYBAL, Raytheon Missile Systems and M. WOLFF, Gulfstream Aerospace Corporation						
1400 hrs AIAA-2020-1924 **Design Optimization, Fabrication, and Testing of a 3D Printed Aircraft Structure Using Fused Deposition Modeling** R. Taylor, B. Niakin, N. Lira, G. Sabine, J. Lee, C. Conklin, University of Texas, Arlington, Arlington, TX; et al.	1430 hrs AIAA-2020-1925 **Buckling of 3D-Printed Cylindrical Shells with Corrugated Surface** E. Labans, C. Bisagni, Delft University of Technology, Delft, The Netherlands	1500 hrs AIAA-2020-1926 **A Micro-Macro Coupling Model for Charactering Interface Tailoring via Printed Polymer Reinforcement** J. Lua, D. Pham, X. Cui, Global Engineering and Materials, Inc., Princeton, NJ; M. Imam, V. Damodaran, P. Prabhakar, University of Wisconsin, Madison, Madison, WI				

Thursday, 9 January 2020						
520-STR-16	**Structural Joints and Repairs**					**Celebration 5**
Chaired by: D. NORWOOD, Lockheed Martin Aeronautics and S. TERMAATH, University of Tennessee						
1400 hrs AIAA-2020-1927 **Verification, Validation, and Limits of Applicability of a Rapid Bonded Joint Analysis Tool** S. Jones, B. Stier, Collier Research Corporation, Newport News, VA; B. Bednarcyk, E. Pineda, NASA Glenn Research Center, Cleveland, OH; U. Palliyaguru, Wichita State University, Wichita, KS	1430 hrs AIAA-2020-1928 **Bearing Response Characterization in Bolted Hybrid Composite Joints** J. Brewer, A. Palazotto, Air Force Institute of Technology, Wright-Patterson AFB, OH; J. Feie, M. Gran, Air Force Research Laboratory, Wright-Patterson AFB, OH	1500 hrs AIAA-2020-1929 **Functionally Graded Adhesives Using Radiation Curing** S. Stapleton, A. Cassano, S. Najafian, D. Schmidt, University of Massachusetts, Lowell, Lowell, MA	1530 hrs AIAA-2020-1930 **Testing and Analysis Correlation of a Large-Scale Composite Sandwich Longitudinal Bonded Joint for Space Launch Vehicle Structures** D. Sleight, A. Satyanarayana, C. Kosztowny, NASA Langley Research Center, Hampton, VA; B. Farrokh, K. Segal, NASA Goddard Space Flight Center, Greenbelt, MD	1600 hrs AIAA-2020-1931 **Failure of Blind Riveted Joint of Carbon Laminates** R. Kottner, L. Bek, J. Krystek, R. Kroft, University of West Bohemia, Pilsen, Czechia		

Thursday, 9 January 2020						
521-TES-2	**Terrestrial Energy Systems**					**Bayhill 24**
Chaired by: K. ANDERSON, CAL POLY POMONA and S. SHERIF, University of Florida						
1400 hrs AIAA-2020-1932 **Numerical Study to Optimize the Melting Process of Phase Change Material Coupled with Extra Fluid** A. Khademi, M. Darbandi, Sharif University of Technology, Tehran, Iran; G. Schneider, University of Waterloo, Waterloo, Canada	1430 hrs AIAA-2020-1933 **Investigation of Novel Configuration of Hydrogen Micromix Combustor for Low NOx Emission** H. Lei, B. Khandelwal, University of Sheffield, Sheffield, United Kingdom	1500 hrs AIAA-2020-1934 **Numerical simulation of airflow and airborne pathogen transport in aircraft cabins: Dynamic Mesh Analyses** E. Khalil, H. Kotb, Cairo University, Cairo, Egypt	1530 hrs AIAA-2020-1935 **Swirling Flow Patterns through Refrigerator Vortex Tubes** M. AbdelGhafaar, K. Beshay, G. ElHariri, E. Khalil, Cairo University, Cairo, Egypt	1600 hrs AIAA-2020-1936 **Numerical Investigations of Smoke Management in Road Tunnel with and without Curtains** H. AlAkam, Cairo University, Cairo, Egypt; A. Fahim, Housing and Building National Research Center, Cairo, Egypt; E. Khalil, Cairo University, Cairo, Egypt		

Thursday, 9 January 2020						
522-TP-12	**Non-Equilibrium Flows III**					**Orlando Ballroom N**
Chaired by: D. ZAKAR, NRL and D. ANDRIENKO, Texas A&M University						
1400 hrs AIAA-2020-1937 **High Temperature Applications Of New Vibrationally Specific Kinetics and Radiation Models For CO2** J. Vargas, Technical University of Lisbon, Lisbon, Portugal; B. Lopez, University of Illinois, Urbana-Champaign, Urbana, IL; M. Lino Da Silva, Technical University of Lisbon, Lisbon, Portugal	1430 hrs AIAA-2020-1938 **QCT Calculations of O_2+O Collisions: Comparison to Molecular Beam Experiments** E. Geistfeld, T. Schwartzentruber, University of Minnesota, Twin Cities, Minneapolis, MN	1500 hrs AIAA-2020-1939 **State-resolved model for inelastic and reactive scattering of the CO+O system in DSMC** B. Gilbert, K. Stephani, University of Illinois, Urbana-Champaign, Urbana, IL	1530 hrs AIAA-2020-1940 **Shock-Tube Measurements of Vibrational Relaxation Times in Oxygen and Nitrogen Mixtures Using Ultraviolet Laser Absorption Spectroscopy** J. Streicher, A. Krish, R. Hanson, Stanford University, Stanford, CA			

Thursday, 9 January 2020						
523-TP-13	**Thermal Management and Control**					**Plaza Ballroom F**
Chaired by: W. TSAI, California State University, Maritime Academy and R. CHAUDHRY, University of Michigan						
1400 hrs AIAA-2020-1941 **Passive Thermal Control of the Primordial Inflation Polarization Explorer (PIPER) Flight Electronics** A. Walts, NASA Goddard Space Flight Center, Greenbelt, MD	1430 hrs AIAA-2020-1942 **Framework for integrated dynamic thermal simulation of future civil transport aircraft** A. van Heerden, D. Judt, C. Lawson, S. Jafari, T. Nikolaidis, Cranfield University, Cranfield, United Kingdom; D. Bosak, Meggitt, PLC, Coventry, United Kingdom					

Thursday, 9 January 2020						
524-UAS-9	**Unmanned Systems and Enabling Technologies for Urban Operation**					**Celebration 16**
Chaired by: K. HOFFLER, Adaptive Aerospace Group, Inc.						
1400 hrs AIAA-2020-1943 **Multi-Sensor Scene Segmentation for Unmanned Air and Ground Vehicles using Dynamic Mode Decomposition** A. Kalur, D. Bhattacharjee, M. Hemati, University of Minnesota, Twin Cities, Minneapolis, MN	1430 hrs AIAA-2020-1944 **Smart Cities and Organizing the Drones' Applications in Urban Areas: N.E.ST (Networking, Efficient, Strategies)** M. Hassanalian, A. Mirzaeinia, K. Lee, New Mexico Institute of Mining and Technology, Socorro, NM	1500 hrs AIAA-2020-1945 **Assured Multi-Mode Navigation for Urban Operations of Small UAS** C. Struempfel, E. Schuster, S. Huschbeck, C. Berth, M. Uijt De Haag, Technical University of Berlin, Berlin, Germany	1530 hrs AIAA-2020-1946 **Neuro-Evolutionary Control for Optimal Dynamic Soaring** R. Perez, J. Arnal, P. Jansen, Royal Military College of Canada, Kingston, Canada	1600 hrs AIAA-2020-1947 **sUTG: A Trajectory Estimation Tool for Small UAS** S. Ayyalasomayajula, N. Nigam, M. Santos, Intelligent Automation, Inc., Rockville, MD	1630 hrs AIAA-2020-1948 **Bird-inspired Velocity Optimization for UAVs in the Urban Environment** C. Williamson, A. Spelt, S. Windsor, University of Bristol, Bristol, United Kingdom	

Thursday, 9 January 2020						
525-WE-11/NDA-16	**Advancements in Uncertainty Analysis for Wind Energy Applications**					**Plaza Ballroom D**
Chaired by: P. BLONIGAN, Sandia National Laboratories and D. FOTI, University of Michigan, Ann Arbor						
1400 hrs AIAA-2020-1949 **Multilevel Uncertainty Quantification Using CFD and OpenFAST Simulations of the SWiFT Facility** A. Hsieh, D. Maniaci, T. Herges, G. Geraci, D. Seidl, M. Eldred, Sandia National Laboratories, Albuquerque, NM; et al.	1430 hrs AIAA-2020-1950 **Multifidelity strategies for forward and inverse uncertainty quantification of wind energy applications** D. Seidl, G. Geraci, Sandia National Laboratories, Albuquerque, NM; R. King, National Renewable Energy Laboratory, Golden, CO; F. Menhorn, Technical University of Munich, Munich, Germany; A. Glaws, National Renewable Energy Laboratory, Golden, CO; M. Eldred, Sandia National Laboratories, Albuquerque, NM	1500 hrs AIAA-2020-1951 **A Probabilistic Approach to Estimating Wind Farm Annual Energy Production with Bayesian Quadrature** R. King, A. Glaws, National Renewable Energy Laboratory, Golden, CO; G. Geraci, M. Eldred, Sandia National Laboratories, Albuquerque, NM	1530 hrs AIAA-2020-1952 **Higher moment multilevel estimators for optimization under uncertainty applied to wind plant design** F. Menhorn, Technical University of Munich, Munich, Germany; G. Geraci, D. Seidl, M. Eldred, Sandia National Laboratories, Albuquerque, NM; R. King, National Renewable Energy Laboratory, Golden, CO; H. Bungartz, Technical University of Munich, Munich, Germany; et al.	1600 hrs AIAA-2020-1953 **Wind Turbine Rotor Design Optimization Using Importance Sampling** I. Satkauskas, E. Gaertner, P. Bortolotti, G. Barter, P. Graf, National Renewable Energy Laboratory, Boulder, CO		

Thursday, 9 January 2020		
526-NW-14 **1530 - 1600 hrs**	**Thursday Afternoon Networking Coffee Break**	**Celebration and Regency Foyers**

Thursday, 9 January 2020		
527-NW-16 **1700 - 1900 hrs**	**Women at SciTech Social Hour and Keynote**	**Regency Ballroom Q**

The Women at SciTech Social Hour and Keynote is a special programming event which will provide all attendees an opportunity to discuss experiences and celebrate women who are leaders in their fields.

Listening to – and Trusting – the Voice Inside
Mary Lynne Dittmar
President and CEO
Coalition for Deep Space Exploration

Friday

Friday, 10 January 2020

528-SB-5 0730 - 0800 hrs	Friday Speaker Briefing	Session Rooms

Friday, 10 January 2020

529-PLNRY-6 0800 - 0900 hrs	Multi-Use Aerospace Technologies	Windermere Ballroom

Moderator: Woodrow Whitlow Jr., Technical Director, National Aerospace Solutions, LLC

Wesley Harris
C.S. Draper Professor of Aeronautics and Astronautics
Massachusetts Institute of Technology

Friday, 10 January 2020

530-NW-17 0900 - 0930 hrs	Friday Morning Networking Coffee Break	Celebration and Regency Foyers

Friday, 10 January 2020

531-ACD-17 — Propulsion/Airframe Integration and Nacelle Design — Orlando Ballroom L

Chaired by: E. DIGIROLAMO, Lockheed Martin Aeronautics and T. TAKAHASHI, Arizona State University

0930 hrs AIAA-2020-1954 **The Effect of Engine Location on the Aerodynamic Efficiency of a Flying-V Aircraft** B. Rubio Pascual, R. Vos, Delft University of Technology, Delft, The Netherlands	1000 hrs AIAA-2020-1955 **Blended Wing Body with Boundary layer Ingestion Conceptual Design in a Multidisciplinary Design Analysis Optimization Environment** Z. Gao, H. Smith, Cranfield University, Cranfield, United Kingdom	1030 hrs AIAA-2020-1956 **Computational Methods for the Preliminary Design of Engine-Nacelle Placement on Transonic Aircraft** K. Frede, T. Takahashi, Arizona State University, Tempe, AZ				

Friday, 10 January 2020

532-ACD-18/UAS-10 — Design of Unmanned Aerial Systems II — Celebration 8

Chaired by: D. WELLS, Lockheed Martin Aeronautics and M. LOGAN, NASA Langley Research Center

0930 hrs AIAA-2020-1957 **Low-Altitude Autonomous Flight of a Solar-Powered UAV System** Y. Bi, L. Zhou, Y. Wen, X. Ma, Y. He, Chinese Academy of Sciences, Beijing, China	1000 hrs AIAA-2020-1958 **Aerodynamic design of a tactical Blended-Wing-Body UAV for the aerial delivery of cargo and lifesaving supplies** P. Panagiotou, D. Mitridis, T. Dimopoulos, UAV integrated Research Center, Thessaloniki, Greece; S. Kapsalis, S. Dimitriou, K. Yakinthos, Aristotle University of Thessaloniki, Thessaloniki, Greece	1030 hrs AIAA-2020-1959 **Guided Air-to-Air Hard-Launch Munitions: A Case Study in Increased Mission Effectiveness** L. Schumacher, R. Barrett-Gonzalez, University of Kansas, Lawrence, Lawrence, KS	1100 hrs AIAA-2020-1960 **Guided Hard-Launch Munitions: Enabling Advanced Air to Ground Combat** L. Schumacher, R. Barrett-Gonzalez, University of Kansas, Lawrence, Lawrence, KS	1130 hrs AIAA-2020-1961 **Monitoring of Inaccessible Areas in GPS-Denied Underground Mines using a Fully Autonomous Encased Safety Inspection Drone** J. Shahmoradi, A. Mirzaeinia, P. Roghanchi, M. Hassanalian, New Mexico Institute of Mining and Technology, Socorro, NM		

Friday, 10 January 2020

533-AFM-17 — **Bio-Inspired UAVs** — **Plaza Ballroom E**

Chaired by: T. RICHARDSON, University of Bristol and M. ABDULRAHIM, AeroVironment

0930 hrs
AIAA-2020-1962
Geometric Formulation for the Dynamics of Monarch Butterfly with the Effects of Abdomen Undulation
M. Sridhar, C. Kang, University of Alabama, Huntsville, Huntsville, AL; T. Lee, George Washington University, Washington, D.C.

1000 hrs
AIAA-2020-1963
Approximate Model for Cycle-Averaged Aerodynamic Forces, and its Application to Stability and Control of Bird-Scale Flapping-Wing Aircraft
A. Paranjape, Tata Consultancy Services, Ltd., Pune, India; S. Chung, California Institute of Technology, Pasadena, CA; H. Hilton, University of Illinois, Urbana-Champaign, Urbana, IL

1030 hrs
AIAA-2020-1964
Longitudinal Grey-Box Model Identification of a Tailless Flapping-Wing MAV Based on Free-Flight Data
J. Nijboer, Delft University of Technology, Delft, The Netherlands; S. Armanini, Imperial College London, London, United Kingdom; M. Karasek, C. de Visser, Delft University of Technology, Delft, The Netherlands

Friday, 10 January 2020

534-AFM-18 — **Performance Adaptive Aeroelastic Wing (PAAW) and FlexOp Projects** — **Bayhill 19**

Chaired by: A. KOTIKALPUDI and B. VANEK, MTA-Sztaki

0930 hrs
AIAA-2020-1965
mAEWing2: Initial Flight Test and System Identification of a Flexible UAV
C. Regan, University of Minnesota, Twin Cities, Minneapolis, MN; A. Kotikalpudi, Systems Technology, Inc., Hawthorne, CA; D. Schmidt, D.K. Schmidt and Associates, Monument, CO; P. Seiler, University of Minnesota, Twin Cities, Minneapolis, MN

1000 hrs
AIAA-2020-1966
Incorporating Flight Dynamics and Control Criteria into MDAO of Composite Aircraft
R. Gupta, W. Zhao, R. Kapania, Virginia Polytechnic Institute and State University, Blacksburg, VA; D. Schmidt, Schmidt & Associates, Monument, CO

1030 hrs
AIAA-2020-1967
Aerostructural design optimization of the D8 aircraft using active aeroelastic tailoring
T. Brooks, Aurora Flight Sciences, Cambridge, MA; B. Smith, Aurora Flight Sciences, Fairborn, OH

1100 hrs
AIAA-2020-1968
Ground Testing of the FLEXOP Demonstrator Aircraft
J. Sodja, R. De Breuker, Delft University of Technology, Delft, The Netherlands; Y. Meddaikar, J. Dillinger, K. Soal, Y. Govers, German Aerospace Center (DLR), Göttingen, Germany; et al.

1130 hrs
AIAA-2020-1969
Results of an Aeroelastically Tailored Wing on the FLEXOP Demonstrator Aircraft
C. Roessler, J. Bartasevicius, S. Koeberle, D. Teubl, M. Hornung, Technical University of Munich, Munich, Germany; Y. Meddaikar, German Aerospace Center (DLR), Göttingen, Germany; et al.

1200 hrs
AIAA-2020-1970
Active Flutter Mitigation Testing on the FLEXOP Demonstrator Aircraft
B. Takarics, B. Patartics, T. Luspay, B. Vanek, Hungarian Academy of Sciences, Budapest, Hungary; C. Roessler, J. Bartasevicius, Technical University of Munich, Munich, Germany; et al.

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535-AMT-19 — **Novel Aerodynamic Measurement Techniques II** — **Bayhill 22**

Chaired by: C. GOYNE, University of Virginia and D. PLEMMONS, National Aerospace Solutions

0930 hrs
AIAA-2020-1971
Experimental Investigation of Optical Distortion in Hypersonic Flows at Mach 6
M. Winter, R. Green, University of Kentucky, Lexington, Lexington, KY; E. Josyula, B. Hagen, J. Hayes, J. Jewell, Air Force Research Laboratory, Wright-Patterson AFB, OH

1000 hrs
AIAA-2020-1972
Digital Phase-Sensitive Holography for Numerical Shock-wave Distortion Cancellation
T. Evans, A. Marsh, J. Uzodinma, Georgia Institute of Technology, Atlanta, GA; D. Guildenbecher, Sandia National Laboratories, Albuquerque, NM; Y. Mazumdar, Georgia Institute of Technology, Atlanta, GA

1030 hrs
AIAA-2020-1973
Application of Focused Laser Differential Interferometry (FLDI) in a Supersonic Boundary Layer
A. Ceruzzi, B. Callis, University of Maryland, College Park, College Park, MD; D. Weber, Worcester Polytechnic Institute, Worcester, MA; C. Cadou, University of Maryland, College Park, College Park, MD

1100 hrs
AIAA-2020-1974
Two-phase Multiplexed Structured Image Capture
W. McCord, C. Smith, M. Gragston, Z. Zhang, University of Tennessee, Knoxville, Knoxville, TN

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536-AMT-20 — **Novel Aerodynamic Measurement Techniques III** — **Bayhill 23**

Chaired by: K. LOWE, Virginia Tech and P. SELLAPPAN, Florida State University

0930 hrs
AIAA-2020-1975
Incipient Stall Detection Using the Real-Time Aerodynamic Load Estimation from a Distributed FADS Sensor Network
R. Goswami, Iowa State University, Ames, IA; A. Kelkar, Clemson University, Clemson, SC; J. Vogel, VSI Aerospace, Ames, IA

1000 hrs
AIAA-2020-1976
Statistical Engineering for Wind Tunnel Testing of Mars Parachute Designs
D. Landman, Old Dominion University, Norfolk, VA

1030 hrs
AIAA-2020-1977
Design of Flush Air Data Systems Insensitive to Manufacturing Variance
G. Dunbar, J. Farnsworth, University of Colorado, Boulder, Boulder, CO

1100 hrs
AIAA-2020-1978
Measuring Atmospheric Boundary Layer Profiles Using UAV Control Data
G. Loubimov, M. Kinzel, S. Bhattacharya, University of Central Florida, Orlando, FL

1130 hrs
AIAA-2020-1979
Deep Learning Image Analysis for Angular Measurements in Wind Tunnels
J. Ferreira, Polytechnic Institute of Setubal, Setubal, Portugal; J. Bell, NASA Ames Research Center, Moffett Field, CA

Friday, 10 January 2020						
537-APA-40	**High-Lift Aerodynamics**					**Barrel Spring II**
Chaired by: D. LACY, Boeing Commercial Airplanes and D. LAZZARA, The Boeing Company						
0930 hrs AIAA-2020-1980 **Experimental Investigation of Dynamic Stall on Pitching Swept Finite-Aspect-Ratio Wings** J. Estevadeordal, K. Tomek, A. Ullah, North Dakota State University, Fargo, ND	1000 hrs AIAA-2020-1981 **A Theory of Stall Hysteresis – Why the reattachment angle is less than the separation stall angle** W. Morris, C. Zenker, Embry-Riddle Aeronautical University, Prescott, AZ; J. Ingraham, Raytheon Company, Tucson, AZ; T. Wolfenbarger, Embry-Riddle Aeronautical University, Prescott, AZ	1030 hrs AIAA-2020-1982 **Predictability of wall-modeled LES for Reynolds number effects of airfoil flows at transonic buffet and near-stall conditions** Y. Fukushima, Y. Tamaki, S. Kawai, Tohoku University, Sendai, Japan	1100 hrs AIAA-2020-1983 **Experimental Analysis of a Blown-Wing Configuration during Transition Flight** Y. Leng, T. Jardin, Higher Institute of Aeronautics and Space, Toulouse, France; M. Bronz, French Civil Aviation University, Toulouse, France; J. Moschetta, Higher Institute of Aeronautics and Space, Toulouse, France	1130 hrs AIAA-2020-1984 **Aerodynamic Analysis of TRAP Wing Under Influence of Heavy Rain Effects** T. Wan, Tamkang University, New Taipei, Taiwan	1200 hrs AIAA-2020-1985 **Harmonic Forcing Amplitude Effects in Globally Unstable Transonic Wing Flow** P. Belesiotis-Kataras, S. Timme, University of Liverpool, Liverpool, United Kingdom	

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538-APA-41	**Transonic Aerodynamics**					**Coral Spring I**
Chaired by: G. GATLIN, NASA Langley Research Center and C. TILMANN, AFRL/RQV						
0930 hrs AIAA-2020-1986 **Triglobal Shock Buffet Instability Study on Infinite Wings** W. He, S. Timme, University of Liverpool, Liverpool, United Kingdom	1000 hrs AIAA-2020-1987 **Catastrophe Theoretic Modelling of Hysteresis in Transonic Shock Buffet** A. Murray, N. Giannellis, G. Vio, University of Sydney, Sydney, Australia	1030 hrs AIAA-2020-1988 **Flow Diagnostics of Transonic Shock Buffet Phenomenon of a Supercritical Airfoil using Dynamic Mode Decomposition** A. Das, R. Carrese, P. Marzocca, RMIT University, Melbourne, Australia; O. Levinski, Defence Science and Technology Group, Melbourne, Australia	1100 hrs AIAA-2020-1989 **Parametric Study of Active Shock Control Bumps for Transonic Shock Buffet Alleviation** J. Geoghegan, N. Giannelis, G. Vio, University of Sydney, Sydney, Australia	1130 hrs AIAA-2020-1990 **Transonic Flow Field Analysis of a Free Flight Capsule using Ballistic Range** H. Kiritani, N. Tanaka, Tohoku University, Sendai, Japan; K. Ohtani, K. Fujita, H. Nagai, Institute of Fluid Science, Sendai, Japan		

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539-APA-42	**Missile/Projectile/Munition Aerodynamics**					**Plaza Ballroom K**
Chaired by: J. DOYLE, US Army CCDC AvMC						
0930 hrs AIAA-2020-1991 **Experimental and Numerical Study of Forebody Vortex Interactions on a Generic Axisymmetric Finned Configuration** R. Sampath Kumar, T. Guha, R. Kumar, Florida State University, Tallahassee, FL; J. DeSpirito, Army Research Laboratory, Aberdeen Proving Ground, MD	1000 hrs AIAA-2020-1992 **Results of the Missile and Projectile Aeroprediction Discussion Group Case Study** J. Doyle, Army Combat Capabilities Development Command Aviation & Missile Center, Redstone Arsenal, AL	1030 hrs AIAA-2020-1993 **A Multi-Disciplinary Approach to Design Long Range Guided Projectiles** J. Vasile, J. Bryson, B. Gruenwald, L. Fairfax, L. Strohm, F. Fresconi, Army Research Laboratory, Aberdeen Proving Ground, MD	1100 hrs AIAA-2020-1994 **Characterization of Independent Aerodynamic Effects of Tail-Fin Deflections on an Axisymmetric Body** C. Mai, Air Force Research Laboratory, Eglin AFB, FL; D. Dawson, R. Kumar, Florida State University, Tallahassee, FL; S. Kirby, T. Birch, Defence Science and Technology Laboratory, Portchester, United Kingdom	1130 hrs AIAA-2020-1995 **Computational Fluid Dynamics Modeling of a Mortar Bomb Separation from a Fixed-Wing Aircraft** B. Yildirim, G. Demir, O. Ayhan, Turkish Aerospace Industries, Ankara, Turkey		

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540-APA-43	**Aerodynamic Design and Analysis III**					**Florida Ballroom B**
Chaired by: K. GERZINA, Northrop Grumman						
0930 hrs AIAA-2020-1996 **A reference point invariant Lamb vector based aerodynamic force breakdown in steady compressible flows** C. Fournis, D. Bailly, ONERA, Meudon, France; R. Tognaccini, University of Naples "Federico II", Naples, Italy	1000 hrs AIAA-2020-1997 **Low Order Models for Transonic Afterbody Aerodynamic Characteristics** G. Zuccolo, D. MacManus, R. Christie, I. Goulos, P. Martin, Cranfield University, Cranfield, United Kingdom	1030 hrs AIAA-2020-1998 **Flutter Prediction using Reduced-Order Modeling** B. Lowe, D. Zingg, University of Toronto, Toronto, Canada	1100 hrs AIAA-2020-1999 **A Simple Model of Rotor Upwash in Ground Effect** A. Suresh, Lockheed Martin Corporation, Stratford, CT	1130 hrs AIAA-2020-2000 **Numerical Analysis for Major Components of Plasma Wind Tunnel using Meshless Method** J. Baek, J. Huh, K. Kim, Seoul National University, Seoul, South Korea		

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541-APA-44	Flapping Wing Aerodynamics					Florida Ballroom C
Chaired by: T. IVANCO, NASA-Langley Research Center						
0930 hrs AIAA-2020-2001 **Preliminary Investigation of the Aerodynamic Response of a Red-Tailed Hawk to a Vertical Gust** P. Swiney, M. Wietstruk, L. Gosdin, J. Bellah, V. Raghav, Auburn University, Auburn, AL	1000 hrs AIAA-2020-2002 **Aeroelastic Characterization of Real and Artificial Monarch Butterfly Wings** R. Twigg, M. Sridhar, J. Pohly, N. Hildebrandt, C. Kang, D. Landrum, University of Alabama, Huntsville, Huntsville, AL; et al.	1030 hrs AIAA-2020-2003 **Experimental Force and Deformation Measurements of Bioinspired Flapping Wings in Ultra-Low Martian Density Environment** J. McCain, J. Pohly, M. Sridhar, C. Kang, D. Landrum, University of Alabama, Huntsville, Huntsville, AL; H. Aono, Tokyo University of Science, Niijyuku, Japan	1100 hrs AIAA-2020-2004 **Measurement of forces on a flapping flexible wing in forward flight** Y. Ryu, Ryerson University, Toronto, Canada; J. Chang, Korea Aerospace University, Goyang, South Korea; J. Chung, Ryerson University, Toronto, Canada	1130 hrs AIAA-2020-2005 **Numerical Investigation of Flapping Wings in Inclined Stroke Plane Kinematics** D. S, V. S, Indian Institute of Technology Madras, Chennai, India		

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542-AS-7	Morphing Structures II					Celebration 4
Chaired by: R. BARRETT-GONZALEZ, The University of Kansas and A. ARRIETA, Purdue University						
0930 hrs AIAA-2020-2006 **Towards the Development of a Span-wise Extending Unmanned Aerial System** F. Phillips, Army Research Laboratory, College Station, TX; T. Henry, J. Hrynuk, R. Haynes, E. Bain, J. Westrich, Army Research Laboratory, Aberdeen Proving Ground, MD	1000 hrs AIAA-2020-2007 **Effect of Spanwise Trailing Edge Gaps on Aerodynamic Performance** P. Sigrest, D. Inman, University of Michigan, Ann Arbor, Ann Arbor, MI	1030 hrs AIAA-2020-2008 **Aerodynamic Efficiency Analysis of Morphing Wings Relative to Non-Morphing Wings** Z. Montgomery, D. Hunsaker, Utah State University, Logan, UT; J. Joo, Air Force Research Laboratory, Wright-Patterson AFB, OH	1100 hrs AIAA-2020-2009 **Modal Analysis of a Morphing Wing for Unsteady Flow Conditions** C. Vazquez, K. Joshi, S. Bhattacharya, J. Kauffman, University of Central Florida, Orlando, FL	1130 hrs AIAA-2020-2010 **Structural and Systems Modelling of a Fluid-driven Morphing Winglet Trailing Edge** S. Vasista, M. Titze, M. Schäfer, O. Bertram, J. Riemenschneider, H. Monner, German Aerospace Center (DLR), Braunschweig, Germany		

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543-ASE-3	Spacecraft Charging, Arcing and Radiation Damage					Plaza Ballroom F
Chaired by: K. TOYODA, Kyushu Institute of Technology and J. LIKAR, The Johns Hopkins University Applied Physics Laboratory						
0930 hrs AIAA-2020-2011 **Consideration on voltage rising in spacecrafts during flashover discharge** K. Toyoda, Kyushu Institute of Technology, Kitakyushu, Japan	1000 hrs AIAA-2020-2012 **Difference in threshold voltage of arc inception between electron beam and ultraviolet environment** K. Toyoda, S. Kose, T. Sasaki, M. Cho, Kyushu Institute of Technology, Kitakyushu, Japan	1030 hrs AIAA-2020-2013 **A Proven Method to Prevent Solar Array Arcing in GEO – Bulk-Conductive Coverglasses** D. Ferguson, Air Force Research Laboratory, Kirtland AFB, NM; E. Plis, Assurance Technology Corporation, Carlisle, MA; R. Hoffmann, Air Force Research Laboratory, Kirtland AFB, NM; D. Engelhart, Assurance Technology Corporation, Carlisle, MA	1100 hrs AIAA-2020-2014 **Maxar EOR Radiation to Power Predictions** C. Keys, B. Watkins, C. Coughlin, B. Hoang, S. Beyene, Maxar, Palo Alto, CA			

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544-CASE-5 — **Challenges in Leadership** — **Plaza Ballroom I**

0930 - 1130 hrs

This session consists of those in leadership or with leadership expertise who are either preparing for, or dealing with, the nuanced complexities that occur with the next wave of disruptive technologies. Impacts on all systems, machine, technical and human, will be discussed. Leadership strategies for success will be identified.

Panelists:

Kellin Bershinsky
Ball Aerospace

Marilee Wheaton
The Aerospace Corporation

Tsutsumi Sophia Bright
The Boeing Company

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545-EXPL-6	Advanced Flight Systems					Florida Ballroom A
Chaired by: M. DIAZ, Georgia Institute of Technology						
0930 hrs AIAA-2020-2015 **Subscale Demonstration and Validation of the Hercules Lunar and Mars Ascent, Descent, and Entry Vehicle** E. Adler, T. Aiken, C. Byrd, E. Howell, T. McClure, J. Nichols, NASA Langley Research Center, Hampton, VA; et al.	1000 hrs AIAA-2020-2016 **Utilizing In-Space Assembly to Add Artificial Gravity Capabilities to Mars Exploration Mission Vehicles** N. Houghton, Michigan State University, East Lansing, MI; J. Fulton, University of Maryland, College Park, College Park, MD; A. Mazarr, Virginia Polytechnic Institute and State University, Blacksburg, VA; S. Park, University of California, San Diego, San Diego, CA; P. Williams, NASA Langley Research Center, Hampton, VA	1030 hrs AIAA-2020-2017 **Exploring aircraft and mission profile designs for long-duration flight in the Venusian atmosphere** E. Noe Dobrea, Planetary Science Institute, Tucson, AZ; J. Freeman, A. Gibson, Empirical Systems Aerospace, Inc., San Luis Obispo, CA; D. Hall, DHC Engineering, San Mateo, CA; L. Lemke, B. Pham, Empirical Systems Aerospace, Inc., San Luis Obispo, CA; et al.	1100 hrs AIAA-2020-2018 **Design a Fixed-Wing Unmanned Aerial Vehicle with Dynamic Soaring Capability for Titan Exploration** V. Pellerito, Lawrence Technological University, Southfield, MI; M. Olivas, M. Hassanalian, New Mexico Institute of Mining and Technology, Socorro, NM			

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546-F360-9 0930 - 1130 hrs	Forum 360: Wow! Look at What We Discovered: Impacts of Multiple Use Aerospace Technology	Regency Ballroom Q

Moderator: John M. Sankovic, President & CEO, Ohio Aerospace Institute

Panelists:

Zarrin Chua
Human Factors Engineer
Aurora Flight Sciences

Narendra Joshi
Chief Scientist, Advanced Propulsion Technologies
GE Research

Michael "Pappy" Penland
Principal Director, Operational Energy Policy and Chief of Staff
Office of the Deputy Assistant Secretary of the Air Force, Operational Energy

John Stetson
Senior Technical Fellow
Lockheed Martin Corporation

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547-FD-78	Bio-Inspired and Low-Reynolds Number Flows IV					Blue Spring II
Chaired by: S. BHATTACHARYA, University of Central Florida and H. AONO, Tokyo University of Science						
0930 hrs AIAA-2020-2019 **Twist Morphing Effect on Propulsive Performance of Bio-Inspired Pitching-Rolling Plates** Y. Tu, J. Wang, University of Virginia, Charlottesville, Charlottesville, VA; H. Hu, Beihang University, Beijing, China; H. Dong, University of Virginia, Charlottesville, Charlottesville, VA	1000 hrs AIAA-2020-2020 **Wake Flow Structure of a Seal-Whisker-Inspired Power Turbine Blade** R. Ahlman, C. Flack, Cleveland State University, Cleveland, OH; V. Shyam, NASA Glenn Research Center, Cleveland, OH; W. Zhang, Cleveland State University, Cleveland, OH	1030 hrs AIAA-2020-2021 **Computational Model of Flow Surrounding Brazilian Free-Tailed Bat Ear Tubercles** S. Fisher, A. Alexander, B. Elbing, Oklahoma State University, Stillwater, OK	1100 hrs AIAA-2020-2022 **Effects of Torsional Stiffness on Hydrodynamic Performance of a Heaving and Passive Pitching Trapezoidal Panel** H. Hu, Y. Wang, Beihang University, Beijing, China; J. Wang, H. Dong, University of Virginia, Charlottesville, Charlottesville, VA	1130 hrs AIAA-2020-2023 **Wall effects on the transition to turbulence in low Reynolds number separated flows** M. Di Luca, K. Breuer, Brown University, Providence, RI		

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548-FD-79	Shock Capturing Methods					Rainbow Spring II
Chaired by: J. CHOI						
0930 hrs AIAA-2020-2024 **A machine learning approach for detecting shocks with high-order hydrodynamic methods** N. Morgan, S. Tokareva, X. Liu, Los Alamos National Laboratory, Los Alamos, NM; A. Morgan, Los Alamos Middle School, Los Alamos, NM	1000 hrs AIAA-2020-2025 **How to preserve symmetry of a Hermite WENO scheme in Lagrangian hydrodynamics?** X. Liu, N. Morgan, D. Burton, Los Alamos National Laboratory, Los Alamos, NM	1030 hrs AIAA-2020-2026 **A Robust Convergence Strategy for Computing Unsteady Shocked Flows using MDG-ICE** A. Corrigan, A. Kercher, D. Kessler, Naval Research Laboratory, Washington, D.C.; D. Williams, Pennsylvania State University, University Park, PA	1100 hrs AIAA-2020-2027 **Computational and Experimental Investigation of Inclined Choked Injection of Gaseous Jet** S. Srivastava, A. Sheridan, M. Henneke, John Zink Company, LLC, Tulsa, OK; K. Sallam, Oklahoma State University, Tulsa, OK			

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549-FD-80	**Turbulent Flows VII**					**Rainbow Spring I**
Chaired by: K. BHAGANAGAR and S. MILLER, University of Florida						
0930 hrs AIAA-2020-2028 **Investigation of Grid-Based Vorticity-Velocity Large Eddy Simulations** G. Whitehouse, A. Boschitsch, Continuum Dynamics, Inc., Ewing, NJ	1000 hrs AIAA-2020-2029 **Effect of Compressibility on Energy Dissipation within Framework of Large Eddy Simulation** Z. Li, K. Jenkins, Z. Rana, Cranfield University, Cranfield, United Kingdom	1030 hrs AIAA-2020-2030 **Parametric Investigation of Low-dissipation Low-dispersion Schemes for Unstructured Flow Solvers in Large Eddy Simulation** M. Carlsson, L. Davidson, Chalmers University of Technology, Gothenburg, Sweden; S. Peng, Swedish Defense Research Agency (FOI), Stockholm, Sweden; S. Arvidson, Saab Group, Linköping, Sweden	1100 hrs AIAA-2020-2031 **Overnight Industrial LES for External Aerodynamics** R. Lohner, George Mason University, Fairfax, VA; C. Othmer, M. Mrosek, Volkswagen, Wolfsburg, Germany; A. Figueroa, A. Degro, George Mason University, Fairfax, VA	1130 hrs AIAA-2020-2032 **Adaptive Construction of Model-Consistent Wall Functions for Two-Equation Turbulence Models with Applications** L. Lambert, D. Pelletier, A. Garon, Polytechnique Montréal, Montréal, Canada	1200 hrs AIAA-2020-2033 **Adaptive Exponential Time Integration of the Navier-Stokes Equations** S. Li, Beijing Computational Science Research Center, Beijing, China; L. Ju, University of South Carolina, Columbia, Columbia, SC; H. Si, Weierstrass Institute for Applied Analysis and Stochastics, Berlin, Germany	

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550-FD-81	**Fluid Structure Interactions IV**					**Blue Spring I**
Chaired by: K. SHOELE, Florida State University and Y. WANG, New Mexico State University						
0930 hrs AIAA-2020-2034 **Influence of surface topology on boundary layer and near-wake behavior of rectangular cylinders** K. Kalan, M. Feero, A. Naguib, M. Koochesfahani, Michigan State University, East Lansing, MI	1000 hrs AIAA-2020-2035 **Vortex shedding from a nonparallel two-cylinder tandem configuration** S. Blaney, D. Sher, P. Lavoie, University of Toronto, Toronto, Canada					

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551-FD-82	**Jet Flows**					**Orlando Ballroom M**
Chaired by: A. MAGSTADT, Lockheed Martin Aeronautics and D. MUNDAY, Miami University						
0930 hrs AIAA-2020-2037 **Streamwise Variation of the Unsteady Pressure Field in the Three-Dimensional Wall Jet** B. Sim, J. Hall, University of New Brunswick, Fredericton, Canada	1000 hrs AIAA-2020-2038 **Numerical Investigation of a Submerged Water Jet Impinging at Various Angles on Ground** X. Zhang, R. Agarwal, H. Gao, L. Zhou, Washington University in St. Louis, St. Louis, MO	1030 hrs AIAA-2020-2039 **PIV Measurements and Reduced-Order Characterization of a Mach 0.3 Axisymmetric Jet** S. Li, L. Ukeiley, M. Sheplak, University of Florida, Gainesville, Gainesville, FL	1100 hrs AIAA-2020-2040 **Transverse Jet Mixing in a Supersonic Grid Turbulence** T. Kouchi, M. Iwachido, T. Nakagawa, Y. Nagata, S. Yanase, Okayama University, Okayama, Japan			

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552-FD-83	**Wing-Gust Interactions II**					**Bayhill 24**
Chaired by: J. JAWORSKI, Lehigh University						
0930 hrs AIAA-2020-2041 **Development of a Transverse Low-Turbulence Gust Generator in a Wind Tunnel** D. Olson, A. Naguib, M. Koochesfahani, Michigan State University, East Lansing, MI	1000 hrs AIAA-2020-2042 **Single-component molecular tagging velocimetry of the boundary layer on a NACA-0012 airfoil plunging across uniform-shear flow** M. Albrecht, A. Naguib, M. Koochesfahani, Michigan State University, East Lansing, MI	1030 hrs AIAA-2020-2043 **Surface pressure and coherent structure evolution on an axially accelerated delta wing** H. Tu, Syracuse University, Syracuse, NY; M. Marzanek, Queen's University, Kingston, Canada; M. Green, Syracuse University, Syracuse, NY; D. Rival, Queen's University, Kingston, Canada	1100 hrs AIAA-2020-2044 **From Sparse Pressure Measurements to Prediction of Instantaneous Loads: A Test Case on Delta Wings in Axial and Transverse Gusts** L. Burelle, W. Yang, D. Rival, Queen's University, Kingston, Canada	1130 hrs AIAA-2020-2045 **The Lift Force Produced by an Unsteady Translating Plate with a Rotating Tip** J. Chowdhury, C. Smith, M. Ringuette, State University of New York, Buffalo, NY	1200 hrs AIAA-2020-2046 **Computational Study of Flapping Wing Response to Vertical Gusts at Low Reynolds Numbers** N. Poudel, L. Wang, M. Yu, University of Maryland, Baltimore County, Baltimore, MD; J. Hrynuk, Army Research Laboratory, Aberdeen Proving Ground, MD	

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553-FD-84	Other Topics in Fluid Dynamics III					Bayhill 20
Chaired by: M. BELISLE, Northrop Grumman Corporation and S. SILTON, US Army Research Laboratory						
0930 hrs AIAA-2020-2047 **Particle Image Velocimetry of a Nano-Second Laser Induced Breakdown in Air** M. Koll, G. Elliott, J. Freund, University of Illinois, Urbana-Champaign, Urbana, IL	1000 hrs AIAA-2020-2048 **Suppression, Enhancement, and Reversal of Hydrodynamic Ejections by Dual-pulse Laser-induced Breakdowns** J. Wang, J. Freund, University of Illinois, Urbana-Champaign, Urbana, IL	1030 hrs AIAA-2020-2049 **Evaluation of a non-equilibrium multi-component evaporation model for blended diesel/alcohol droplets** P. Yi, H. Zhang, S. Yang, University of Minnesota, Minneapolis, Minneapolis, MN	1100 hrs AIAA-2020-2050 **Nonlinear Slosh Damping Testing and Analysis for Launch Vehicle Propellant Tanks** T. Van Zwieten, NASA Langley Research Center, Hampton, VA; J. Brodnick, Jacobs, Huntsville, AL; S. Reese, Brigham Young University, Provo, UT; M. Ruth, Northrop Grumman Corporation, Greenbelt, MD; B. Marsell, NASA Kennedy Space Center, Cape Canaveral, FL; R. Parks, NASA Marshall Space Flight Center, Huntsville, AL	1130 hrs AIAA-2020-2051 **Design and Testing of a Field Gradient System to Control a Hybrid Magneto-Active Slosh Control System** M. Vairamani, Embry-Riddle Aeronautical University, Daytona Beach, FL; K. Crosby, Carthage College, Pleasant Prairie, WI; P. Llanos, S. Gangadharan, Embry-Riddle Aeronautical University, Daytona Beach, FL; N. Somanath, Pratt & Whitney, Hartford, CT		

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554-FD-85	Hypersonic and Non-Equilibrium Flows III					Rock Spring I & II
Chaired by: P. KRETH, University of Tennessee Space Institute and A. HADID, Northrop Grumman Aerospace Systems						
0930 hrs AIAA-2020-2052 **Vibrational turbulent Prandtl number in flows with thermal non-equilibrium** A. Baranwal, D. Donzis, R. Bowersox, Texas A&M University, College Station, TX	1000 hrs AIAA-2020-2053 **Drag Estimation on Wedge-Shaped Protuberances in High-Speed Flows** A. Kshitij, Arizona State University, Tempe, AZ; S. Prince, J. Stollery, Cranfield University, Cranfield, United Kingdom	1030 hrs AIAA-2020-2054 **Wall Temperature Effects on Two-dimensional Hypersonic Laminar Separation** D. Exposito Brioso, S. Laxman Gai, A. Neely, University of New South Wales at the Australian Defence Force Academy, Canberra, Australia	1100 hrs AIAA-2020-2055 **Control of Unstart Phenomenon in a Hydrogen Fuelled Scramjet Engine** A. Varshney, M. Varshney, F. Baig, Aligarh Muslim University, Aligarh, India	1130 hrs AIAA-2020-2056 **Shock-Shock Interaction over a Hemisphere in Hypersonic Flow - Part II** N. Kianvashrad, D. Knight, Rutgers University, Piscataway, NJ		

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555-FD-86	Instability and Transition VII					Plaza Ballroom J
Chaired by: A. SESCU, Mississippi State University and H. FASEL, University of Arizona						
0930 hrs AIAA-2020-2057 **Hypersonic Boundary Layer Receptivity over a Blunt Cone to Freestream Pulse Disturbances** S. He, X. Zhong, University of California, Los Angeles, Los Angeles, CA	1000 hrs AIAA-2020-2058 **Controlled Stationary/Traveling Cross-flow Mode Interaction in Mach 6 Boundary Layer** A. Arndt, T. Corke, E. Matlis, University of Notre Dame, Notre Dame, IN; M. Semper, U.S. Air Force Academy, Colorado Springs, CO	1030 hrs AIAA-2020-2059 **Hypersonic Boundary-Layer Stabilization using Steady Blowing and Suction: Effect of Forcing Location** X. Wang, D. Lallande, University of Alabama, Tuscaloosa, Tuscaloosa, AL	1100 hrs AIAA-2020-2060 **Proper Orthogonal Decomposition Analysis of Hypersonic Turbulent Boundary Layers Subjected to Streamline Wall Curvature** J. Carlson, R. Bowersox, N. Tichenor, Texas A&M University, College Station, TX	1130 hrs AIAA-2020-2061 **Numerical Study of Hypersonic Boundary-Layer Transition Delay through Second-Mode Absorption** R. Fievet, H. Deniau, J. Brazier, E. Piot, ONERA, Toulouse, France		

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556-FD-87	RANS/LES/Hybrid Turbulence Modeling and Applications IV					Plaza Ballroom D
Chaired by: S. POROSEVA, The University of New Mexico and A. HADID, Lockheed Martin Corporation						
0930 hrs AIAA-2020-2062 **Wall-resolved implicit large eddy simulation of transonic buffet over the OAT15A airfoil using a discontinuous Galerkin method** C. Nguyen, S. Terrana, J. Peraire, Massachusetts Institute of Technology, Cambridge, MA	1000 hrs AIAA-2020-2063 **Large-Eddy Simulations Using High-Order Finite Volume Methods with the Stretched-Vortex Subgrid-Scale Model** S. Walters, X. Gao, S. Guzik, Colorado State University, Fort Collins, CO	1030 hrs AIAA-2020-2064 **Numerical Simulation of Laminar Separation on a NACA0018 Airfoil in Freestream Turbulence** E. Tangermann, M. Klein, University of the German Federal Armed Forces, Neubiberg, Germany	1100 hrs AIAA-2020-2065 **Numerical Simulation of Unsteady Flow over a 30P30N Slat by Embedded-LES** Y. Kojima, Tokyo University of Agriculture and Technology, Koganei, Japan; T. Ishida, A. Hashimoto, T. Aoyama, Japan Aerospace Exploration Agency (JAXA), Chofu, Japan	1130 hrs AIAA-2020-2066 **Wall-modeled Large-eddy Simulations on Non-body-conforming Cartesian Grids: Analysis of the Conservation Laws** Y. Tamaki, Tohoku University, Sendai, Japan; R. Takaki, Japan Aerospace Exploration Agency (JAXA), Sagamihara, Japan; S. Kawai, Tohoku University, Sendai, Japan		

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557-GNC-34	Distributed and Cooperative Systems					Bayhill 18
Chaired by: J. LANGELAAN, Pennsylvania State University and R. COWLAGI, Worcester Polytechnic Inst						
0930 hrs AIAA-2020-2067 **Mass and Center of Mass Location Estimation for a Multi-lift Slung Load** J. Geng, J. Langelaan, Pennsylvania State University, University Park, PA	1000 hrs AIAA-2020-2068 **Multi-UAV Distributed Control for Load Transportation in Precision Agriculture** A. Hegde, D. Ghose, Indian Institute of Science, Bengaluru, India	1030 hrs AIAA-2020-2069 **A Trapping Pursuit Strategy for Capturing a High Speed Evader** T. Vechalapu, Self, Visakhapatnam, India	1100 hrs AIAA-2020-2070 **Performance Analysis of a Team of Highly Capable Individual Unmanned Aerial Systems** R. Bhusal, B. Taner, K. Subbarao, University of Texas, Arlington, Arlington, TX			

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558-GNC-35	Intelligent/Autonomous Aerial Systems III					Bayhill 32
Chaired by: E. JOHNSON, Pennsylvania State University and I. FARUQUE, MAE						
0930 hrs AIAA-2020-2071 **Robust Control Strategy for Quadcopters using Sliding Mode Control and Model Predictive Control** D. Bhattacharjee, K. Subbarao, University of Texas, Arlington, Arlington, TX	1000 hrs AIAA-2020-2072 **Longitudinal control of transition to powered flight for a parachute-dropped multirotor** T. Opazo, J. Langelaan, Pennsylvania State University, University Park, PA	1030 hrs AIAA-2020-2073 **Modeling and Control of a Flapping Wing Hawkmoth Micro Air Vehicle Using Generalized Mixed Sensitivity Hierarchical Design Approach** A. Rodriguez, Arizona State University, Tempe, AZ; K. Puttannaiah, Intel Corporation, Hillsboro, OR; K. Mondal, S. Biswal, B. Wallace, Arizona State University, Tempe, AZ	1100 hrs AIAA-2020-2074 **Trajectory Tracking Control of Highly Maneuverable Fixed-Wing Unmanned Aerial Vehicles** J. Hernandez Ramirez, M. Nahon, McGill University, Montréal, Canada	1130 hrs AIAA-2020-2075 **Towards a Unified Model-Free Control Architecture for Tailsitter Micro Air Vehicles: Flight Simulation Analysis and Experimental Flights** J. Olszanecki Barth, J. Condomines, M. Bronz, G. Hattenberger, French Civil Aviation University, Toulouse, France; J. Moschetta, Higher Institute of Aeronautics and Space, Toulouse, France; C. Join, University of Lorraine, Nancy, France; et al.	1200 hrs AIAA-2020-2076 **Unmanned Aircraft Systems Conflict Resolution Using Return-to-Course Maneuver** S. Dey, A. Ratnoo, Indian Institute of Science, Bengaluru, India	

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559-GNC-36	Space Robotic Systems II					Bayhill 33
Chaired by: S. ULRICH, Carleton University						
0930 hrs AIAA-2020-2077 **Robust Control for Active Debris Removal of a Large Flexible Space Structure** S. Singh, German Aerospace Center (DLR), Bremen, Germany; E. Mooij, Delft University of Technology, Delft, The Netherlands	1000 hrs AIAA-2020-2078 **Lyapunov Vector Fields for Thrust-Limited Spacecraft Docking with an Elliptically-Orbiting Uncooperative Tumbling Target** J. Hough, S. Ulrich, Carleton University, Ottawa, Canada	1030 hrs AIAA-2020-2079 **Compliant Spacecraft Capture via a Nonlinear Disturbance Observer-based Impedance Controller** A. Crain, S. Ulrich, Carleton University, Ottawa, Canada; A. Flores-Abad, University of Texas, El Paso, El Paso, TX	1100 hrs AIAA-2020-2080 **Adaptive Control of a Tendon-Driven Manipulator for the Capture of Non-Cooperative Space Targets** J. Kernot, S. Ulrich, Carleton University, Ottawa, Canada			

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560-GTE-13	Numerical Topics in Gas Turbines					Manatee Spring II
Chaired by: A. SURYANARAYANAN, TechnipFMC						
0930 hrs AIAA-2020-2081 **Flow Field Analysis of a Dynamically Forced Impingement Jet Array** A. Berthold, F. Haucke, J. Weiss, Technical University of Berlin, Berlin, Germany	1000 hrs AIAA-2020-2082 **Computational studies of turbine-stage, with variable inlet temperature; comparison between LES and IDDES** M. Ilie, M. Chan, V. Soloiu, Georgia Southern University, Statesboro, GA	1030 hrs AIAA-2020-2083 **Ignition delay time and CO time-history measurements in a shock tube during high performance jet fuel surrogate combustion** A. Laich, E. Ninnemann, S. Neupane, S. Vasu, University of Central Florida, Orlando, FL	1100 hrs AIAA-2020-2084 **Steady-state CFD Simulations of a Small-scale Turbojet Engine from Idle to Cruise Conditions** A. Briones, University of Dayton, Dayton, OH; J. Sykes, Innovative Scientific Solutions, Inc., Dayton, OH; B. Rankin, A. Caswell, Air Force Research Laboratory, Wright-Patterson AFB, OH			

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561-GTE-14/PC-26	**Combustors III**					**Bayhill 21**
Chaired by: R. GEJJI, Purdue University and S. PARK						
0930 hrs AIAA-2020-2085 **An Assessment of Equation-of-state for Supercritical Combustion Systems** R. Kancherla, University of Central Florida, Orlando, FL; S. Martin, Embry-Riddle Aeronautical University, Daytona Beach, FL; S. Vasu, University of Central Florida, Orlando, FL	1000 hrs AIAA-2020-2086 **Thermodynamic Analysis of Supercritical CO2 Systems** P. Yi, H. Zhang, S. Yang, University of Minnesota, Minneapolis, Minneapolis, MN	1030 hrs AIAA-2020-2087 **Incompletely Stirred Reactor Network Modeling of a Model Gas Turbine Combustor** S. Gkantonas, University of Cambridge, Cambridge, United Kingdom; A. Giusti, Imperial College London, London, United Kingdom; E. Mastorakos, University of Cambridge, Cambridge, United Kingdom	1100 hrs AIAA-2020-2088 **CFD Predictions of Soot & CO Emissions Generated by a Partially-Fueled 9-Element Lean-Direct Injection Combustor** M. Raju, Vantage Partners, LLC, Brook Park, OH; C. Wey, NASA Glenn Research Center, Cleveland, OH	1130 hrs AIAA-2020-2089 **Modeling Non-Premixed Jets in Vitiated Cross Flows Using Unsteady Flamelets and *In-situ* Tabulation** X. Ren, P. Kundu, Argonne National Laboratory, Lemont, IL		

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562-INPSI-4	**High Speed Inlets**					**Silver Spring I**
Chaired by: D. BENCHERGUI, Bombardier Inc. and D. RITTENBERG, Siemens PLM Software						
0930 hrs AIAA-2020-2090 **Design Factors for Two-Dimensional, External-Compression Supersonic Inlets** J. Slater, NASA Glenn Research Center, Cleveland, OH	1000 hrs AIAA-2020-2091 **Characterization of Bleedless Shockwave Boundary Layer Interaction Control for High Speed Intakes** N. Khobragade, J. Gustavsson, R. Kumar, Florida State University, Tallahassee, FL; S. Kirby, T. Birch, Defence Science and Technology Laboratory, Fareham, United Kingdom; C. Mai, Air Force Research Laboratory, Eglin AFB, FL; et al.	1030 hrs AIAA-2020-2092 **High fidelity simulations of supersonic intakes** K. Boychev, G. Barakos, R. Steijl, University of Glasgow, Glasgow, United Kingdom; S. Shaw, MBDA UK Ltd, Filton, Bristol, United Kingdom	1100 hrs AIAA-2020-2093 **Selection of a Scale Resolving Simulation Technique for Flow Field Analysis of a High Speed Air Intake** B. Mufti, T. Irfan, Air University, Islamabad, Pakistan; Z. Toor, King Fahd University of Petroleum and Minerals, Dhahran, Saudi Arabia; J. Masud, Air University, Islamabad, Pakistan			

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563-IS-19	**Explainable AI (Invited)**					**Celebration 10**
Chaired by: S. ALIMO and D. SELVA, Texas A&M University						
0930 hrs AIAA-2020-2094 **Interactive Explanation of Entry, Descent, and Landing Simulations (Invited)** S. Santini De Leon, D. Selva, Texas A&M University, College Station, TX; D. Way, NASA Langley Research Center, Hampton, VA	1000 hrs AIAA-2020-2095 **Data Accountability and Uncertainty Analysis for the Mars Science Laboratory (Invited)** S. Alimo, B. Kahovec, D. Divsalar, P. Tavallali, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA	1030 hrs AIAA-2020-2096 **Explainable Non-Cooperative Spacecraft Pose Estimation using Convolutional Neural Networks (Invited)** S. Alimo, D. Jeong, K. Man, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA	1100 hrs AIAA-2020-2097 **A Deep Learning Approach for Pose Estimation of Non-Cooperative Spacecraft (Invited)** S. Alimo, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA; V. Capuano, A. Hess, A. Harvard, K. Kim, S. Chung, California Institute of Technology, Pasadena, CA			

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564-IS-20	**Learning Reasoning and Data Driven Systems III**					**Celebration 11**
Chaired by: A. YUCEL, Lockheed Martin Aeronautics and Y. WAN, University of Texas, Arlington						
0930 hrs AIAA-2020-2098 **Improving Trust in Deep Neural Networks with Nearest Neighbors** R. Lee, Stinger Ghaffarian Technologies, Inc., Moffett Field, CA; J. Clarke, University of Massachusetts Amherst, Amherst, MA; A. Agogino, D. Giannakopoulou, NASA Ames Research Center, Moffett Field, CA	1000 hrs AIAA-2020-2099 **Guidance for Designing Safety into Urban Air Mobility: Hazard Analysis Techniques** M. Graydon, N. Neogi, NASA Langley Research Center, Hampton, VA; K. Wasson, Amplifocus, LLC, Charlottesville, VA	1030 hrs AIAA-2020-2100 **Safe Curriculum Learning for Optimal Flight Control of Unmanned Aerial Vehicles with Uncertain System Dynamics** T. Pollack, E. Van Kampen, Delft University of Technology, Delft, The Netherlands	1100 hrs AIAA-2020-2101 **Waypoint-based Flight-deck Interval Management** M. Sun, S. Abraham, N. Singh, C. Fleming, University of Virginia, Charlottesville, Charlottesville, VA	1130 hrs AIAA-2020-2102 **Control Software: Research Directions in the Intersection of Control Theory and Software Engineering** J. Bradley, H. Bagheri, University of Nebraska, Lincoln, Lincoln, NE		

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565-MAT-14	**Fatigue and Fracture II**					**Celebration 13**
Chaired by: T. XU, Old Dominion University and D. POWELL, SpaceX						
0930 hrs AIAA-2020-2103 **A Micromechanics based model for the prediction of compression fatigue failure of fiber reinforced composites** P. Davidson, A. Waas, University of Michigan, Ann Arbor, Ann Arbor, MI	1000 hrs AIAA-2020-2104 **Healing of Mode-I Fatigue Crack in Fiber Reinforced Composites using Thermoplastic Healants** N. Vishe, B. Jony, M. Thapa, S. Mulani, S. Roy, University of Alabama, Tuscaloosa, Tuscaloosa, AL	1030 hrs AIAA-2020-2105 **A Flexible Life Prediction Approach for Single-Crystal Nickel-Based Alloys** F. Irmak, N. Wijeyeratne, University of Central Florida, Orlando, FL; T. Yun, Doosan Corporation, Seoul, South Korea; A. Gordon, University of Central Florida, Orlando, FL	1100 hrs AIAA-2020-2106 **Bayesian Calibration of Strain-Life Models with Priors from Similar Alloys** A. Dourado, F. Irmak, F. Viana, A. Gordon, University of Central Florida, Orlando, FL	1130 hrs AIAA-2020-2107 **Predicting Responses of a Single Crystal Ni-Base Superalloy under a Wide Range of Monotonic and Cyclic Conditions** N. Wijeyeratne, F. Irmak, A. Gordon, University of Central Florida, Orlando, FL	1200 hrs AIAA-2020-2108 **Effective Properties of Granular Composites as a Function of Relative Damage Evolution in Constituent Phases** S. Povolny, G. Seidel, Virginia Polytechnic Institute and State University, Blacksburg, VA; D. Hammerand, M4 Engineering, Inc., Long Beach, CA	

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566-MAT-15	**Multiscale and Multi-Physics Modeling II**					**Celebration 6**
Chaired by: E. PINEDA, NASA Glenn Research Ctr and M. MAIARU, University of Massachusetts Lowell						
0930 hrs AIAA-2020-2109 **Microstructural Methods for Developing High-Performance Composite Materials** S. Ghaffari, G. Seon, A. Makeev, University of Texas, Arlington, Arlington, TX	1000 hrs AIAA-2020-2110 **Computationally-Efficient Structural Models for Analysis of Woven Composites** I. Kaleel, A. Garcia de Miguel, M. Petrolo, A. Pagani, E. Carrera, Technical University of Turin, Turin, Italy; T. Ricks, NASA Glenn Research Center, Cleveland, OH; et al.	1030 hrs AIAA-2020-2111 **A Coupled Flow and Residual Stress Model for Predicting Performance Variations of Composites Manufactured via Vacuum Assisted Resin Transfer Molding** W. Chen, D. Zhang, University of Connecticut, Storrs, Storrs, CT; X. Ren, J. Lua, Global Engineering and Materials, Inc., Princeton, NJ	1100 hrs AIAA-2020-2112 **A multiscale modeling for elastoplastic constitutive equations of crosslinked epoxy polymers** H. Park, M. Cho, Seoul National University, Kwanak, South Korea			

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567-MDO-20/APA-45	**Aerodynamic Shape Optimization II**					**Celebration 2**
Chaired by: A. NING, BYU and N. WUKIE, Air Force Research Laboratory						
0930 hrs AIAA-2020-2113 **Minimum Induced Drag for Tapered Wings Including Structural Constraints** J. Taylor, D. Hunsaker, Utah State University, Logan, UT	1000 hrs AIAA-2020-2114 **A Time-Spectral Adjoint Approach for Aerodynamic Shape Optimization Under Periodic Wakes** P. He, A. Luder, C. Mader, J. Martins, K. Maki, University of Michigan, Ann Arbor, Ann Arbor, MI	1030 hrs AIAA-2020-2115 **Aerothermal Optimization of X-57 High-Lift Motor Nacelle** J. Anibal, C. Mader, J. Martins, University of Michigan, Ann Arbor, Ann Arbor, MI	1100 hrs AIAA-2020-2116 **A Block Lower-Upper Symmetric Gauss-Seidel Scheme for Adjoint Solvers** W. Yao, Queen's University Belfast, Belfast, United Kingdom; S. Marques, University of Surrey, Surrey, United Kingdom; T. Robinson, Queen's University Belfast, Belfast, United Kingdom			

Friday, 10 January 2020						
568-MST-15	**Model- and Simulation-Based Development**					**Coral Spring II**
Chaired by: J. PETTENGILL, The Boeing Company and N. MACCHIARELLA, Embry-Riddle Aeronautical University						
0930 hrs AIAA-2020-2117 **Leveraging Probabilistic Modeling and Machine Learning in Engineering Complex Systems and System-of-Systems** P. Pouya, A. Madni, University of Southern California, Los Angeles, CA	1000 hrs AIAA-2020-2118 **Towards a Common Modeling Environment for Aircraft Power and Thermal Systems Design and Optimization: Introducing the Simulation Platform APTT-SP** E. Iskrenova-Ekiert, State University of New York, Brockport, NY; T. Deppen, D. Dierker, PC Krause and Associates, Indianapolis, IN; S. Patnaik, Air Force Research Laboratory, Wright-Patterson AFB, OH	1030 hrs AIAA-2020-2119 **Cyberphysical Aircraft Development and Test using Industrial Linux Servers** B. Hale, Applied Dynamics International, Ann Arbor, MI	1100 hrs AIAA-2020-2120 **Dynamic UAS Simulation Framework for Energy and Mission Performance Optimization** N. Prabhakar, D. Karbowski, I. Liu, R. Torelli, Argonne National Laboratory, Lemont, IL	1130 hrs AIAA-2020-2121 **Human-in-the-Loop Space System Simulation** G. Nickey, J. Black, Virginia Polytechnic Institute and State University, Blacksburg, VA; K. Ernandes, W. Johnson, L3Harris Technologies, Inc., Melbourne, FL		

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569-MST-16 — **Multidisciplinary Modeling and Simulation Across Domains** — **Bayhill 30**

Chaired by: M. RASSAIAN, RASSAIAN, LLC and A. ELMILIGUI, NASA Langley Research Center

0930 hrs	1000 hrs	1030 hrs	1100 hrs			
AIAA-2020-2122	AIAA-2020-2123	AIAA-2020-2124	AIAA-2020-2125			
Rapid Vehicle Aerodynamic Modeling for Use in Early Design with Rotor-Fuselage Interference	**CFD simulations of super/hypersonic missiles: validation, sensitivity analysis and improved design**	**Aerodynamic studies of rotor-stator turbine stage; a computational approach using LES**	**CFD-based Multi-Axis Maneuver Simulation for System Identification of Flexible Transport Aircraft**			
J. Pascasio, M. Smith, Georgia Institute of Technology, Atlanta, GA	V. Viti, V. Rao, J. Abanto, ANSYS, Inc., Lebanon, NH	M. Ilie, M. Chan, V. Soloiu, Georgia Southern University, Statesboro, GA	M. Ritter, M. Roeser, L. Reimer, German Aerospace Center (DLR), Göttingen, Germany			

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570-NDA-17/MDO-21 — **Special Session: Managing Multiple Information Sources of Multi-Physics Systems** — **Celebration 3**

Chaired by: P. BERAN, US Air Force Research Laboratory(AFRL/RQVC) and B. SMARSLOK, AFRL/RQH

0930 hrs	1000 hrs	1030 hrs	1100 hrs	1130 hrs		
AIAA-2020-2127	AIAA-2020-2128	AIAA-2020-2129	AIAA-2020-2130	AIAA-2020-2131		
Efficient Multi-Information Source Multiobjective Bayesian Optimization	**A B-Spline-based Generative Adversarial Network Model for Fast Interactive Airfoil Aerodynamic Optimization**	**Multifidelity Cross-Entropy Estimation of Conditional Value-at-Risk for Risk-Averse Design Optimization**	**Risk-Based Design Optimization Via Probability of Failure, Conditional Value-at-Risk, and Buffered Probability of Failure**	**Multi-Fidelity Reduced Order Modeling of Representative Hypersonic Panel**		
D. Khatamsaz, L. Peddareddygari, S. Friedman, D. Allaire, Texas A&M University, College Station, TX	X. Du, P. He, J. Martins, University of Michigan, Ann Arbor, Ann Arbor, MI	A. Chaudhuri, Massachusetts Institute of Technology, Cambridge, MA; B. Peherstorfer, New York University, New York, NY; K. Willcox, University of Texas, Austin, Austin, TX	A. Chaudhuri, Massachusetts Institute of Technology, Cambridge, MA; M. Norton, Naval Postgraduate School, Monterey, CA; B. Kramer, Massachusetts Institute of Technology, Cambridge, MA	P. Song, X. Wang, M. Mignolet, Arizona State University, Tempe, AZ		

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571-OPS-2 — **Spacecraft Operations and Support II** — **Bayhill 31**

Chaired by: J. REDFERN, Southwest Research Institute and C. SIMPSON, University of Alabama, Tuscaloosa

0930 hrs	1000 hrs	1030 hrs	1100 hrs	1130 hrs		
AIAA-2020-2132	AIAA-2020-2133	AIAA-2020-2134	AIAA-2020-2135	AIAA-2020-2136		
Operational Design for Hayabusa2 Touch-Down to Ryugu	**Task and attitude control scheduling of multiple agile satellites considering task-dependent transition time**	**REACCH - Reactive electro-adhesive capture cloth mechanism to enable safe grapple of cooperative/non-cooperative space debris**	**Development of Cislunar Space Logistics Networks for Satellite Constellation Support**	**Orbital Maneuvering Vehicle for Smallsat Deployment and Development of Versatile Simulation Model for Rapid Mission Analyses**		
S. Yasuda, K. Matsushima, NEC Corporation, Tokyo, Japan; F. Terui, Y. Mimasu, N. Ogawa, G. Ono, Japan Aerospace Exploration Agency (JAXA), Sagamihara, Japan; et al.	J. Kim, J. Ahn, Korea Advanced Institute of Science and Technology, Daejeon, South Korea	S. Narayanan, D. Barnhart, R. Rogers, University of Southern California, Marina del Rey, CA; D. Ruffatto, E. Schaler, N. Van Crey, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA; et al.	A. Collins, K. Johnson, Air Force Institute of Technology, Wright-Patterson AFB, OH	K. Owens, Moog, Inc., East Aurora, NY		

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572-PC-27 — **Combustion Modeling and Simulation** — **Bayhill 25**

Chaired by: M. ANAND, Rolls-Royce Corp and V. ACHARYA, Georgia Institute of Technology

0930 hrs	1000 hrs	1030 hrs	1100 hrs	1130 hrs	1200 hrs	
AIAA-2020-2137	AIAA-2020-2138	AIAA-2020-2139	AIAA-2020-2140	AIAA-2020-2141	AIAA-2020-2142	
Assessment of Surrogate Models for Inverse Uncertainty Quantification of Simulant Combustion	**Large Eddy Simulation of Sooting Turbulent Non-Premixed Mixing Layers**	**A robust reacting flow solver with detailed transport, chemistry, and steady-state preserving splitting schemes based on OpenFOAM and Cantera**	**Nonlinear Reduced Order Modeling for Large Eddy Simulation of Turbulent Reacting Flows**	**Data-Informed Species Limiters for Local Robustness Control of Reduced-Order Models of Reacting Flow**	**Ignition Enhancement of F-24 Jet Fuel by a Hot Surface for Aircraft Propulsion Systems**	
R. Ranjan, S. Karpe, P. Patel, S. Menon, Georgia Institute of Technology, Atlanta, GA	S. Karpe, R. Ranjan, S. Menon, Georgia Institute of Technology, Atlanta, GA	D. Zhou, S. Yang, University of Minnesota, Minneapolis, Minneapolis, MN	R. Ranjan, S. Menon, Georgia Institute of Technology, Atlanta, GA	C. Huang, K. Duraisamy, University of Michigan, Ann Arbor, Ann Arbor, MI; C. Merkle, Purdue University, West Lafayette, IN	J. Ryu, CCDC Army Research Laboratory, Aberdeen Proving Ground, MD; A. Motily, T. Lee, University of Illinois, Urbana-Champaign, Urbana, IL; R. Scarcelli, S. Som, Argonne National Laboratory, Lemont, IL; K. Kim, CCDC Army Research Laboratory, Aberdeen Proving Ground, MD; et al.	

Friday, 10 January 2020						
573-PC-28	**Combustion Kinetics II**					**Bayhill 26**
Chaired by: C. CADOU, University of Maryland and E. PETERSEN, Texas A&M University						
0930 hrs AIAA-2020-2143 **A N_2O Laser Absorption Diagnostic Near 4.6 µm for Shock-Tube Chemical Kinetics Studies** C. Mulvihill, S. Alturaifi, O. Mathieu, E. Petersen, Texas A&M University, College Station, TX	1000 hrs AIAA-2020-2146 **Shock tube and laser absorption study of CO time-histories during combustion of branched alkenes** F. Arafin, A. Laich, R. Rahman, E. Ninnemann, R. Greene, J. Baker, University of Central Florida, Orlando, FL; et al.	1030 hrs AIAA-2020-2144 **Ignition-Delay Time Measurements of Heavy Hydrocarbons in an Aerosol Shock Tube** J. Hargis, S. Cooper, O. Mathieu, Texas A&M University, College Station, TX; B. Guo, Texas A&M University Qatar, Doha, Qatar, E. Petersen, Texas A&M University, College Station, TX	1100 hrs AIAA-2020-2145 **High-temperature DMMP combustion measurements in a shock tube using laser absorption spectroscopy** R. Rahman, S. Neupane, J. Baker, E. Ninnemann, F. Arafin, A. Masunov, University of Central Florida, Orlando, FL; et al.	1130 hrs AIAA-2020-2147 **Numerical Simulation of a Controlled Trajectory Rapid Compression Machine** K. Bavandla, D. Zhou, A. Tripathi, Z. Sun, S. Yang, University of Minnesota, Minneapolis, Minneapolis, MN		

Friday, 10 January 2020						
574-PDL-16	**Plasma Actuators III**					**Bayhill 17**
Chaired by: S. BANE, Purdue University, School of Aeronautics and Astronautics and S. LEONOV, University of Notre Dame						
0930 hrs AIAA-2020-2148 **Time-resolved Measurements of Electric Field, Electron Temperature, and Electron Density in a Nanosecond-Pulsed Dielectric Barrier Discharge** T. Chen, Princeton University, Princeton, NJ; B. Goldberg, Sandia National Laboratories, Livermore, CA; A. Rousso, Y. Ju, E. Kolemen, Princeton University, Princeton, NJ	1000 hrs AIAA-2020-2149 **New pulsed jet using spark plasma discharge: Subsonic configuration** N. Benard, National Center for Scientific Research (CNRS), Futuroscope, France; H. Zong, Delft University of Technology, Delft, The Netherlands; Y. Zhang, FCAAP, Florida State University, Tallahassee, FL; M. Kotsonis, Delft University of Technology, Delft, The Netherlands; G. Acher, National Center for Scientific Research (CNRS), Futuroscope, France; L. Cattafesta, FCAAP, Florida State University, Tallahassee, FL; et al.	1030 hrs AIAA-2020-2150 **Feasibility Study on the Use of Non-Thermal Plasma for a Cold Radio Blackout Experiment** H. Jakob, M. Kim, University of Southampton, Southampton, United Kingdom	1100 hrs AIAA-2020-2151 **Investigation on Voltage Waveform Characteristics of Plasma Actuators with Different Electrode Geometry for High Performance** A. Nakano, Y. Kaneko, H. Nishida, Tokyo University of Agriculture and Technology, Koganei, Japan	1130 hrs AIAA-2020-2152 **Effect of DBD plasma actuation on structures in a plane mixing layer** S. Yadala Venkata, N. Benard, National Center for Scientific Research (CNRS), Poitiers, France; M. Kotsonis, Delft University of Technology, Delft, The Netherlands; E. Moreau, National Center for Scientific Research (CNRS), Poitiers, France		

Friday, 10 January 2020						
575-PDL-17	**Plasma Modeling**					**Barrel Spring I**
Chaired by: T. MOELLER, University of Tennessee Space Institute and A. TROPINA, Texas A&M University						
0930 hrs AIAA-2020-2153 **Numerical modeling of plasma-surface interactions in space vacuum** N. Nuwal, D. Levin, University of Illinois, Urbana-Champaign, Urbana, IL	1000 hrs AIAA-2020-2154 **Validation of Boltzmann discrete velocity method flow solver for diatomic gases and multi-component monatomic gas mixtures** R. Harris, CFD Research Corporation (CFDRC), Huntsville, AL	1030 hrs AIAA-2020-2155 **Solution of Maxwell's Equations Using Fourth-Order Modified Runge-Kutta Scheme on Transformed Coordinates** V. Sharma, K. Hoffmann, Wichita State University, Wichita, KS	1100 hrs AIAA-2020-2156 **Hybrid Method of Moments to Predict Nanoparticle Nucleation, Growth and Charging in Dusty Plasmas** S. Narayanan, S. Yang, S. Girshick, University of Minnesota, Minneapolis, Minneapolis, MN			

Friday, 10 January 2020						
576-PGC-11	**Pressure Gain Combustion: Physics Modeling and Exploration**					**Manatee Spring I**
Chaired by: C. BROPHY, Naval Postgraduate School and E. PAULSON, Air Force Research Laboratory						
0930 hrs AIAA-2020-2157 **Preliminary Computational Assessment of Disk Rotating Detonation Engine Configurations** D. Paxson, NASA Glenn Research Center, Cleveland, OH	1000 hrs AIAA-2020-2158 **Numerical Investigation of Centerbody-less Rotating Detonation Combustors** D. Schwer, R. Johnson, A. Kercher, D. Kessler, A. Corrigan, Naval Research Laboratory, Washington, D.C.	1030 hrs AIAA-2020-2159 **Numerical Investigation of Shock-Induced Combustion of Coal-H2-Air mixtures in a Unwrapped Non-Premixed Detonation Channel** M. Salvadori, Georgia Institute of Technology, Atlanta, GA; I. Dunn, J. Sosa, University of Central Florida, Orlando, FL; S. Menon, Georgia Institute of Technology, Atlanta, GA; K. Ahmed, University of Central Florida, Orlando, FL	1100 hrs AIAA-2020-2160 **Numerical Simulation on Disk Rotating Detonation Engine: Influence of Internal Flow Field Structure on Performance** T. Watanabe, N. Jourdaine, K. Ozawa, N. Tsuboi, Kyushu Institute of Technology, Kitakyushu, Japan; T. Kojima, Japan Aerospace Exploration Agency (JAXA), Tokyo, Japan; K. Hayashi, Aoyama Gakuin University, Sagamihara, Japan	1130 hrs AIAA-2020-2161 **Quantification of Non-Ideal Combustion in Numerical Simulations of Rotating Detonation Engines Using Chemical Explosive Mode Analysis** P. Pal, C. Xu, Argonne National Laboratory, Lemont, IL; G. Kumar, S. Drennan, Convergent Science, Inc., New Braunfels, TX; B. Rankin, Air Force Research Laboratory, Wright-Patterson AFB, OH; S. Som, Argonne National Laboratory, Lemont, IL		

Friday, 10 January 2020						
577-SATS-4	**Small Satellites Missions**					**Celebration 14**
Chaired by: J. STRAUB, North Dakota State University						
0930 hrs AIAA-2020-2162 **The Use of a 3U Cubesat for the Germination of Seeds in Space** A. Alanazi, J. Straub, A. Jones, North Dakota State University, Fargo, ND	1000 hrs AIAA-2020-2163 **Lunar CubeSat Lander to Explore Mare Tranquilitatis pit** H. Kalita, J. Thangavelautham, University of Arizona, Tucson, Tucson, AZ					

Friday, 10 January 2020						
578-SCS-9	**Solar Sails, Solar Shields, and Other Tentioned Membranes**					**Celebration 12**
Chaired by: H. SAKAMOTO, Tokyo Institute of Technology and S. PELLEGRINO, California Institute of Technology						
0930 hrs AIAA-2020-2164 **Computational Multibody Dynamics of Heliogyro Solar Sail under Spin-Deployment** J. Kang, Inha University, Incheon, South Korea; K. Park, University of Colorado, Boulder, Boulder, CO	1000 hrs AIAA-2020-2165 **Characterizing and modeling the viscoplastic behavior of creases in Kapton polyimide films** B. Dharmadasa, M. McCallum, F. Lopez Jimenez, University of Colorado, Boulder, Boulder, CO	1030 hrs AIAA-2020-2166 **A modular drag-deorbiting sail for large satellites in low Earth orbit** B. Taylor, S. Fellowes, B. Dyer, A. Viquerat, G. Aglietti, University of Surrey, Guildford, United Kingdom	1100 hrs AIAA-2020-2167 **Advances in Low-Cost Manufacturing and Folding of Solar Sail Membranes** O. Stohlman, J. Fernandez, G. Dean, NASA Langley Research Center, Hampton, VA; N. Schneider, TEAMS3, Hampton, VA; J. Kang, National Institute of Aerospace, Hampton, VA; R. Barfield, NASA Langley Research Center, Hampton, VA; et al.			

Friday, 10 January 2020						
579-SD-18	**Structural Dynamics**					**Celebration 15**
Chaired by: D. JOHNSON, NASA Glenn Research Center and S. LIGUORE, Boeing Research & Technology						
0930 hrs AIAA-2020-2168 **Active vibration suppression control for multiple mechanical coolers on board observation satellites** S. Shigeto, S. Mitani, N. Bando, T. Hashimoto, Japan Aerospace Exploration Agency (JAXA), Tsukuba, Japan	1000 hrs AIAA-2020-2169 **Modeling Pyroshock Attenuation in Space Structures** V. Babuska, D. Lee, Sandia National Laboratories, Albuquerque, NM	1030 hrs AIAA-2020-2170 **Data-Driven Model Reduction For Membrane Space Structure** T. Umezawa, Nihon University, Funabashi, Japan				

Friday, 10 January 2020						
580-SD-19	**Aeroelasticity I**					**Celebration 1**
Chaired by: Z. SOTOUDEH, Cal Poly Pomona and V. SURYAKUMAR, Facebook Inc						
0930 hrs AIAA-2020-2171 **Determination of Experimental/ Numerical Errors on Identification of Flutter Derivatives for a NACA 0020 Airfoil** M. Jafari, F. Hou, A. Shirazi, Iowa State University, Ames, IA; M. Hassanalian, New Mexico Institute of Mining and Technology, Socorro, NM	1000 hrs AIAA-2020-2172 **A database of flutter characteristics for simple low and medium aspect ratio wings at low speeds** E. De Oro Fernandez, T. Andrianne, G. Dimitriadis, University of Liege, Liege, Belgium	1030 hrs AIAA-2020-2173 **Enhanced Dynamic Vibration Absorber for Flutter Control** M. Kassem, Military Technical College, Cairo, Egypt; Z. Yang, Y. Gu, W. Wang, Northwestern Polytechnical University, Xi'an, China				

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581-SFM-25	**Attitude Dynamics, Determination and Control III**					**Bayhill 27**
Chaired by: M. AKELLA, University of Texas at Austin						
0930 hrs AIAA-2020-2174 **Wavelet Covariance Analysis for Light Curve Slew Maneuver Detection** J. Chapman, A. Dianetti, J. Crassidis, State University of New York, Niagara Falls, NY	1000 hrs AIAA-2020-2175 **Theory and Evaluation of a Stability Condition for Second Order Repetitive Control** P. Cui, Beihang University, Beijing, China; A. Ismail, R. Longman, Columbia University, New York, NY; Z. Liu, H. Xu, Beihang University, Beijing, China	1030 hrs AIAA-2020-2176 **Observability Study for Estimation of Rigid Body Attitude and Inertia Tensor** J. Helmuth, K. DeMars, Texas A&M University, College Station, TX	1100 hrs AIAA-2020-2177 **Orbit and Attitude Performance of the LightSail 2 Solar Sail Spacecraft** J. Mansell, D. Spencer, Purdue University, West Lafayette, IN; B. Plante, Boreal Space, Moffett Field, CA; A. Diaz, Ecliptic Enterprises Corporation, Moffett Field, CA; M. Fernandez, J. Bellardo, California Polytechnic State University, San Luis Obispo, CA; et al.			

Friday, 10 January 2020						
582-SFM-26	**Dynamical Systems Theory Applied to Space Flight Problems**					**Bayhill 28**
Chaired by: N. PARRISH						
0930 hrs AIAA-2020-2178 **Applications of Clustering to Higher-Dimensional Poincaré Maps in Multi-Body Systems** S. Bonasera, N. Bosanac, University of Colorado, Boulder, Boulder, CO	1000 hrs AIAA-2020-2179 **Design of Transfer Trajectories Between Planar and Spatial Quasi-Satellite Orbits** N. Pushparaj, Graduate University for Advanced Studies, Sagamihara, Japan; N. Baresi, Y. Kawakatsu, Japan Aerospace Exploration Agency (JAXA), Sagamihara, Japan	1030 hrs AIAA-2020-2180 **Minimum Fuel Trajectory Design Using Sparse Optimal Control in Three-Body Problem** Y. Kayama, M. Bando, S. Hokamoto, Kyushu University, Fukuoka, Japan	1100 hrs AIAA-2020-2181 **Landing Trajectories to Moons from the Unstable Invariant Manifolds of Periodic Libration Point Orbits** L. Bury, J. McMahon, University of Colorado, Boulder, Boulder, CO			

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583-SFM-27	**Low-Thrust Trajectory Design and Optimization II**					**Bayhill 29**
Chaired by: R. SOOD, University of Alabama, Tuscaloosa						
0930 hrs AIAA-2020-2182 **Operations-driven low-thrust trajectory optimization with applications to DESTINY+** D. Dei Tos, T. Yamamoto, N. Ozaki, Japan Aerospace Exploration Agency (JAXA), Sagamihara, Japan; Y. Tanaka, Waseda University, Tokyo, Japan; F. Gonzalez-Franquesa, N. Pushparaj, Graduate University for Advanced Studies, Sagamihara, Japan; et al.	1000 hrs AIAA-2020-2183 **Low-Thrust Trajectory Design Using Multi-Mode Propulsion Systems: A Grid-Based Thruster Model** E. Taheri, Auburn University, Auburn, AL	1030 hrs AIAA-2020-2184 **Composite Smooth Control Method for Low-Thrust Trajectory Design: Variable Specific Impulse Engine** E. Taheri, Auburn University, Auburn, AL	1100 hrs AIAA-2020-2185 **Implicit Formulations of Bounded-Impulse Trajectory Models for Preliminary Interplanetary Low-Thrust Analysis** R. Falck, S. McCarty, J. Pekosh, NASA Glenn Research Center, Cleveland, OH; K. Ponnapalli, Vantage Partners, LLC, Brook Park, OH	1130 hrs AIAA-2020-2186 **Reinforcement Learning for Sequential Low-Thrust Orbit Raising Problem** L. Arora, A. Dutta, Wichita State University, Wichita, KS		

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584-STR-17	**Aircraft Structural Design, Test and Optimization II**					**Celebration 5**
Chaired by: D. PHILLIPS, NASA-Marshall Space Flight Center and T. MANN, NASA-Langley Research Center						
0930 hrs AIAA-2020-2187 **Effects of Radome Design on Antenna Performance in Transonic Flight Conditions** A. Escalera Mendoza, R. Hale, University of Kansas, Lawrence, Lawrence, KS	1000 hrs AIAA-2020-2188 **Improving Structural Test and Analysis Correlation Using Digital Image Correlation Boundary Measurements** A. Lovejoy, NASA Langley Research Center, Hampton, VA; N. Gardner, D. Dawicke, Analytical Services & Materials, Inc., Hampton, VA; C. Jutte, Craig Technologies, Inc., Merritt Island, FL; B. Smith, Aurora Flight Sciences, Beavercreek, OH	1030 hrs AIAA-2020-2189 **Aeroelastic Characteristics of Morphing Wings with Pantographic Substructures** N. Tsushima, M. Tamayama, H. Arizono, Japan Aerospace Exploration Agency (JAXA), Tokyo, Japan				

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585-TP-14	**Non-Equilibrium Flows IV**					**Orlando Ballroom N**
Chaired by: R. CHAUDHRY, University of Michigan and R. FU, University of Kentucky						
0930 hrs AIAA-2020-2190 **Applicability of 5, 7, and 11 Species Air Models in Nonequilibrium Hypersonic Reacting Flows** S. Gimelshein, ERC, Inc., Edwards AFB, CA; I. Wysong, Air Force Research Laboratory, Edwards AFB, CA	1000 hrs AIAA-2020-2191 **Implementation of a Chemical Kinetics Model for Hypersonic Flows in Air for High-Performance CFD** R. Chaudhry, I. Boyd, University of Michigan, Ann Arbor, Ann Arbor, MI; E. Torres, T. Schwartzentruber, G. Candler, University of Minnesota, Minneapolis, Minneapolis, MN	1030 hrs AIAA-2020-2192 **HyperCode: A framework for high-order accurate turbulent non-equilibrium hypersonic flow simulations** K. Vogiatzis, Next Frontier, LLC, Tucson, AZ; A. Munafò, M. Panesi, University of Illinois, Urbana-Champaign, Urbana, IL; P. Vedula, University of Oklahoma, Norman, Norman, OK; E. Josyula, Air Force Research Laboratory, Wright-Patterson AFB, OH	1100 hrs AIAA-2020-2193 **High-Order Techniques for Multi-Component Turbulent Non-Equilibrium Hypersonic Flows** A. Munafò, University of Illinois, Urbana-Champaign, Urbana, IL; K. Vogiatzis, Next Frontier, LLC, Tucson, AZ; D. Ghosh, Lawrence Livermore National Laboratory, Livermore, CA; P. Vedula, University of Oklahoma, Norman, Norman, OK; M. Panesi, University of Illinois, Urbana-Champaign, Urbana, IL; E. Josyula, Air Force Research Laboratory, Wright-Patterson AFB, OH			

Friday, 10 January 2020						
586-UAS-11	**Unmanned Systems Mission Management, Coordination, Planning, and Autonomy I**					**Celebration 16**
Chaired by: S. GURURAJAN						
0930 hrs AIAA-2020-2194 **Real-time Geospatial Positioning for UAVs in GPS-Denied Environment Using LiDAR Data** H. Kim, Mississippi University for Women, Columbus, MS; D. Kim, University of Cincinnati, Cincinnati, OH; S. Kim, Mississippi State University, Mississippi State, MS	1000 hrs AIAA-2020-2195 **Automated Management of Small Unmanned Aircraft System Communications and Navigation Contingency** J. Jung, S. Nag, NASA Ames Research Center, Moffett Field, CA	1030 hrs AIAA-2020-2196 **Onboard Turbulence Recognition System for Improved UAS Operator Situational Awareness** A. Bateman, M. DeVore, N. Richards, Barron Associates, Inc., Charlottesville, VA; S. De Wekker, University of Virginia, Charlottesville, Charlottesville, VA	1100 hrs AIAA-2020-2197 **Achievable Endurance of Hybrid UAV Operating in Time-Varying Energy Fields** V. Dobrokhodov, K. Jones, C. Walton, I. Kaminer, Naval Postgraduate School, Monterey, CA	1130 hrs AIAA-2020-2198 **Analysis of TSP Heuristics for Fuel-Constrained UAS Path Planning applied to Polar Research Missions** A. Blevins, S. Keshmiri, D. Shukla, G. Godfrey, University of Kansas, Lawrence, KS	1200 hrs AIAA-2020-2199 **Path Planning for Lunar Polar Exploration Mission Using Linear Temporal Logic** Y. Kikuchi, Keio University, Yokohama, Japan; H. Inoue, Japan Aerospace Exploration Agency (JAXA), Sagamihara, Japan; K. Hashimoto, Osaka University, Osaka, Japan; S. Adachi, Keio University, Yokohama, Japan	

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587-UAS-12	Unmanned Systems Mission Management, Coordination, Planning, and Autonomy II					Celebration 9
Chaired by: V. SCHULTZ, NASA Langley Research Center						
0930 hrs AIAA-2020-2200 **Autonomous Distributed Atmospheric Measurement Acquisition (ADAMA) – A Multi-Agent sUAS Mission** E. Adcock, B. Allen, J. Neilan, M. Vaughn, R. Williams, Z. Johns, NASA Langley Research Center, Hampton, VA; et al.	1000 hrs AIAA-2020-2201 **Improving UAV-Based Target Geolocation Accuracy through Automatic Camera Parameter Discovery** A. Fabian, R. Klenke, P. Truslow, Virginia Commonwealth University, Richmond, VA	1030 hrs AIAA-2020-2202 **Supporting Disaster Relief Operations through UTM: Operational Concept and Flight Tests of Unmanned and Manned Vehicles at a Disaster Drill** A. Andreeva-Mori, D. Kubo, K. Kobayashi, Y. Okuno, Japan Aerospace Exploration Agency (JAXA), Tokyo, Japan; J. Homola, M. Johnson, NASA Ames Research Center, Moffett Field, CA; et al.	1100 hrs AIAA-2020-2203 **Fairness in Decentralized Strategic Deconfliction in UTM** A. Evans, M. Egorov, S. Munn, Airbus, Sunnyvale, CA	1130 hrs AIAA-2020-2204 **BVLOS Operations of Fixed-Wing UAVs for the Collection of Volcanic Ash Above Fuego Volcano, Guatemala** B. Schellenberg, T. Richardson, R. Clarke, M. Watson, J. Freer, A. McConville, University of Bristol, Bristol, United Kingdom; et al.		

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588-AMT-21	Advancements in Planar, Volumetric, and High-Speed Imaging Techniques					Bayhill 21
Chaired by: S. SCHUMAKER, AFRL/RQTC and P. HSU, Spectral Energies, LLC						
1330 hrs AIAA-2020-2205 **Three Dimensional Schlieren using Iterative Phase Tomography** N. Raju, M. Sargunaraj, University of Central Florida, Orlando, FL; B. Medhi, ShanMukha Innovations, Bengaluru, India; M. T M, Indian Institute of Technology Madras, Chennai, India	1400 hrs AIAA-2020-2206 **High-Magnification, Long-Working Distance Plenoptic Background Oriented Schlieren (BOS)** D. Guildenbecher, M. Kunzler, W. Sweatt, K. Casper, Sandia National Laboratories, Albuquerque, NM	1430 hrs AIAA-2020-2207 **Seedless Velocimetry in a Turbulent Jet using Schlieren Imaging and a Wavelet-based Optical Flow Method** B. Schmidt, W. Page, J. Sutton, Ohio State University, Columbus, OH	1500 hrs AIAA-2020-2208 **3D Flame Measurements Using Tomography Reconstruction Integrating View Registration** N. Liu, L. Ma, University of Virginia, Charlottesville, Charlottesville, VA	1530 hrs AIAA-2020-2209 **Tomographic Time Resolved Laser Induced Incandescence** E. Hall, B. Halls, D. Richardson, D. Guildenbecher, Sandia National Laboratories, Albuquerque, NM; E. Cenker, Aramco, Ryad, Saudi Arabia; M. Paciaroni, Benedictine College, Atchison, KS		

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589-AMT-22	Novel Calibration, Error Analysis, Uncertainty Quantification, and Experimental Verification					Bayhill 22
Chaired by: M. SHEPLAK, University of Florida and Y. MAZUMDAR, Georgia Institute of Technology						
1330 hrs AIAA-2020-2210 **A calibration system for low-velocity flows at stratospheric conditions** A. Mahon, J. Pointer, D. Lawrence, B. Argrow, University of Colorado, Boulder, Boulder, CO	1400 hrs AIAA-2020-2211 **Aerodynamic Design and Validation of a Contraction Profile for Flow Field Improvement and Uncertainty Quantification in a Subsonic Wind Tunnel** V. Vishwanathan, M. Szoke , J. Duetsch-Patel, E. Totten, A. Gargiulo, D. Fritsch, Virginia Polytechnic Institute and State University, Blacksburg, VA; et al.	1430 hrs AIAA-2020-2212 **Static Tap Pressure Measurement Bias Error Introduced by Aerodynamic Noise** S. Sato, C. Chuck, The Boeing Company, Seattle, WA	1500 hrs AIAA-2020-2213 **A Novel, High-Frequency, Reciprocal Calibration Method for Dynamic Pressure Sensors Used in High-Speed Flows** D. Mills, T. Chen, S. Horowitz, W. Patterson, Interdisciplinary Consulting Corporation, Gainesville, FL; M. Sheplak, University of Florida, Gainesville, Gainesville, FL	1530 hrs AIAA-2020-2214 **Aerodynamic Design and Assessment of Modular Test Section Walls for CFD Validation in Hybrid Anechoic Wind Tunnels** J. Duetsch-Patel, V. Vishwanathan, J. Minionis, E. Totten, A. Gargiulo, D. Fritsch, Virginia Polytechnic Institute and State University, Blacksburg, VA; et al.		

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590-APA-46	Low-Reynolds Number Aerodynamics					Florida Ballroom C
Chaired by: S. NARSIPUR, North Carolina State University and V. BHAGWANDIN, US Army Research Laboratory						
1330 hrs AIAA-2020-2215 **A Post Stall Experimental Study of an Eppler 387 Airfoil at a Reynolds Number of 300,000** B. Emmerson, D. Verstraete, University of Sydney, Sydney, Australia	1400 hrs AIAA-2020-2216 **Turbulence and Sinusoidal Pitching: the effect on Low Reynolds number Wings** N. Kay, P. Richards, R. Sharma, University of Auckland, Auckland, New Zealand	1430 hrs AIAA-2020-2217 **Airfoil Drag at Low- to Medium Reynolds Numbers - A Novel Estimation Method** F. Goetten, M. Havermann, C. Braun, Aachen University of Applied Sciences, Aachen, Germany; M. Marino, C. Bil, RMIT University, Melbourne, Australia	1500 hrs AIAA-2020-2218 **The study of the effect of the cavity on the flow over NACA 0012 and Selig 7003 aerofoil at Low Reynolds number using Vortex Shading Method** S. Patial, P. Jain, P. Rawat, A. Bodavula, R. Yadav, University of Petroleum and Energy Studies, Dehradun, India	1530 hrs AIAA-2020-2219 **The influence of leading-edge tubercles on airfoil performance at low Reynolds numbers** S. S, V. L, National Aerospace Laboratories, Bengaluru, India; R. O N, Indian Institute of Science, Bengaluru, India	1600 hrs AIAA-2020-2220 **Effects of Varying Peak Shape on Aerodynamic Performance of a Corrugated Airfoil** Z. Shabbir, National University of Sciences and Technology, Islamabad, Pakistan; H. Shah, Auburn University, Auburn, AL; A. Mansoor, Bahria University, Karachi, Pakistan; A. Ahmed, Auburn University, Auburn, AL; S. Tayyab, Technical University of Milan, Milan, Italy	

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591-APA-47	Applied Computational Fluid Dynamics					Florida Ballroom B
Chaired by: C. HUMMER, USAF						
1330 hrs AIAA-2020-2221 **Computational Analyses to Support Design of Hollow Cylinder Flare Experiments at AEDC Hypervelocity Tunnel 9** R. Kumar, B. Wheaton, Johns Hopkins University Applied Physics Laboratory, Laurel, MD; E. Marineau, Office of Naval Research, Arlington, VA; I. Kurits, J. Lafferty, Arnold Engineering Development Complex, Silver Spring, MD	1400 hrs AIAA-2020-2222 **Geometry Parameterisation and Aerodynamic Characteristics of Axisymmetric Afterbodies** G. Zuccolo, D. MacManus, I. Goulos, P. Martin, Cranfield University, Cranfield, United Kingdom	1430 hrs AIAA-2020-2223 **Multi-fidelity, Multidisciplinary Analysis of an Efficient Supersonic Air Vehicle** M. Lickenbrock, M. Rumpfkeil, University of Dayton, Dayton, OH; P. Beran, R. Kolonay, Air Force Research Laboratory, Wright-Patterson AFB, OH	1500 hrs AIAA-2020-2224 **Experimental and RANS analysis of full Mars airplane configurations** S. Taniguchi, University of Tokyo, Sagamihara, Japan; A. Oyama, Japan Aerospace Exploration Agency (JAXA), Sagamihara, Japan; M. Okamoto, Kanazawa Institute of Technology, Nonoichi, Japan; M. Anyoji, Kyusyu University, Kasuga, Japan; K. Fujita, H. Nagai, Tohoku University, Sendai, Japan	1530 hrs AIAA-2020-2225 **Effects of Aircraft Integration on Compact Nacelle Aerodynamics** F. Tejero , I. Goulos, D. MacManus, Cranfield University, Cranfield, United Kingdom; C. Sheaf, Rolls-Royce Group plc, Derby, United Kingdom	1600 hrs AIAA-2020-2226 **On the Flow Measurements of Simulated Helicopter Exhausts** Z. Teo, W. Wong, M. Mohamed, H. Ang, B. Ng, T. New, Nanyang Technological University, Singapore, Singapore	

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592-APA-48	Aerodynamics of Novel and Unconventional Configurations					Coral Spring I
Chaired by: M. CONWAY, The Aerospace Corporation						
1330 hrs AIAA-2020-2227 **Comparative Analysis of Aerodynamic Characteristics of a Transport Aircraft and its AWACS Variant** Z. Toor, King Fahd University of Petroleum and Minerals, Dhahran, Saudi Arabia; J. Masud, T. Irfan, B. Mufti, Air University, Islamabad, Pakistan; O. Khan, Auburn University, Auburn, AL	1400 hrs AIAA-2020-2228 **Experimental Aerodynamic Analysis of a 4.6%-Scale Flying-V Subsonic Transport** M. Palermo, R. Vos, Delft University of Technology, Delft, The Netherlands	1430 hrs AIAA-2020-2229 **Study of Two-element Airfoils for Long Endurance Flight at Low Reynolds Numbers** S. Jadhav, Y. Cui, W. Chan, J. Tay, C. Chan, S. Chew, National University of Singapore, Singapore, Singapore; et al.	1500 hrs AIAA-2020-2230 **Model Design and Pre-Test CFD Analysis for a Supersonic Retropropulsion Wind Tunnel Test** K. Edquist, A. Korzun, W. Kleb, NASA Langley Research Center, Hampton, VA; V. Hawke, Science and Technology Corporation, Moffett Field, CA; Y. Rizk, M. Olsen, NASA Ames Research Center, Moffett Field, CA; et al.			

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593-AS-8	SHM and Smart Materials					Celebration 4
Chaired by: J. KAUFFMAN, University of Central Florida and D. BENCHERGUI, Bombardier Inc.						
1330 hrs AIAA-2020-2231 **Phase Transformation Characteristics of High-Temperature Shape Memory Alloy under Tension, Compression, and Bending Actuation Cycling** D. Martin, L. Xu, D. Lagoudas, Texas A&M University, College Station, TX	1400 hrs AIAA-2020-2232 **Classification of Cohesive Damages and Micro Voids in An Adhesive Joint using Artificial Neural Networks** N. Jayakody, Mississippi State University, Starkville, MS; R. Jha, Rowan University, Glassboro, NJ	1430 hrs AIAA-2020-2233 **Carbon Nanotube Enhanced Shape Memory Polyurethane for Improved Mechanical Properties and Shape Recovery** S. Datta, Arizona State University, Tempe, AZ; T. Henry, A. Hall, Army Research Laboratory, Aberdeen Proving Ground, MD; A. Chattopadhyay, Arizona State University, Tempe, AZ				

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594-FD-89	Computational Fluid Dynamics Applications II					Plaza Ballroom I
Chaired by: S. SHERER, AFRL/RQVA and D. GONZALEZ, Naval Surface Warfare Center						
1330 hrs AIAA-2020-2234 **Swelling Behavior of IPN and Copolymer Hydrogels by Lattice Boltzmann Method** P. Boschetti, Simón Bolivar University, Naiguata, Venezuela; O. Pelliccioni, M. Sabino, N. Vera, A. Ontiveros, M. Pappaterra, Simón Bolivar University, Caracas, Venezuela	1400 hrs AIAA-2020-2235 **A Versatile Level Set Based Immersed Boundary Reconstruction for Bio-Inspired Flow Applications** J. Wang, P. Han, X. Deng, H. Dong, University of Virginia, Charlottesville, Charlottesville, VA	1430 hrs AIAA-2020-2236 **Towards DES of Flow Around a Rotorcraft Fuselage Using an Immersed Boundary Method** H. Park, D. Linton, B. Thornber, University of Sydney, Sydney, Australia	1500 hrs AIAA-2020-2237 **RANS models validation of the flow separation on a 6:1 prolate spheroid at angle of incidence** M. Torrente Pardo, Airbus, Marignane, France; C. Lienard, R. Boisard, ONERA, Meudon, France; D. Desvigne, Airbus, Marignane, France; M. Costes, ONERA, Meudon, France	1530 hrs AIAA-2020-2238 **USM3D Analyses in Support of the NASA Langley 0.3-Meter Transonic Cryogenic Tunnel Test of Boundary-Layer Thickener Configurations** M. Bozeman, A. Elmiligui, G. Jones, W. Milholen, NASA Langley Research Center, Hampton, VA		

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595-FD-90	**Instability and Transition VIII**					**Plaza Ballroom J**
Chaired by: C. BADRYA, Technical University of Braunschweig and A. GROSS, New Mexico State University						
1330 hrs AIAA-2020-2239 **Nonlinear centrifugal instabilities in curved free shear layers** O. Es-Sahli, A. Sescu, Mississippi State University, Starkville, MS; M. Afsar, University of Strathclyde, Glasgow, United Kingdom	1400 hrs AIAA-2020-2240 **Numerical Stability Investigation of Inward Radial Rayleigh-Be'nard-Poiseuille Flow** M. Hasan, A. Gross, New Mexico State University, Las Cruces, NM	1430 hrs AIAA-2020-2241 **Local Linear Stability Analysis of Laminar Separation for Helicopter Blade Section Undergoing Dynamic Stall** G. Wen, A. Gross, New Mexico State University, Las Cruces, NM	1500 hrs AIAA-2020-2242 **Secondary-Instability-Mode Identification in Hypersonic Crossflow-Dominated Boundary Layers** A. Riha, K. Groot, A. Moyes, H. Reed, Texas A&M University, College Station, TX	1530 hrs AIAA-2020-2243 **High-Frequency Secondary Instabilities Downstream of a Forward-Facing Step** J. Eppink, NASA Langley Research Center, Hampton, VA	1600 hrs AIAA-2020-2244 **Computational Investigations of Side-Loads in a Thrust-Optimized Parabolic Nozzle during High-Altitude Testing** C. Lee, K. Choi, C. Kim, Seoul National University, Seoul, South Korea; S. Han, Korea Aerospace Research Institute, Daejeon, South Korea	

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596-INPSI-5	**Nozzles**					**Silver Spring I**
Chaired by: L. GEA, Boeing Engineering Operations & Technology and R. NICHOLS, The University of Alabama at Birmingham						
1330 hrs AIAA-2020-2245 **Active Injection Nozzles for High-Speed Flow Mixing** J. Solomon, Tuskegee University, Tuskegee, AL	1400 hrs AIAA-2020-2246 **Shock Vector Control Technique for Aerospike Nozzles** M. Ferlauto, A. Ferrero, R. Marsilio, Technical University of Turin, Turin, Italy	1430 hrs AIAA-2020-2247 **Aerodynamic shape optimization of aircraft engine nozzles based on Computer-Aided Design** S. Bagy, Safran Group, Moissy-Cramayel, France; B. Mohammadi, Alexander Grothendieck Institute of Montpellier (IMAG), Montpellier, France; M. Meheut, ONERA, Meudon, France; M. Lallia, P. Coat, Safran Group, Moissy-Cramayel, France	1500 hrs AIAA-2020-2248 **Numerical Analysis of Afterburner Characteristics of a Low Bypass Ratio Turbofan Engine at Various Flight Conditions** M. Safdar, National University of Sciences and Technology, Islamabad, Pakistan; J. Masud, Air University, Islamabad, Pakistan			

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597-IS-21	**Learning Reasoning and Data Driven Systems IV**					**Celebration 11**
Chaired by: Y. WAN, University of Texas, Arlington and A. YUCEL, Lockheed Martin Aeronautics						
1330 hrs AIAA-2020-2249 **Obstacle avoidance for quadrotors using reinforcement learning and obstacle-airflow interactions** G. van Dam, E. Van Kampen, Delft University of Technology, Delft, The Netherlands	1400 hrs AIAA-2020-2250 **Adaptive Real-Time Clustering Method for Dynamic Visual Tracking of Very Flexible Wings** T. Mkhoyan, C. de Visser, R. De Breuker, Delft University of Technology, Delft, The Netherlands	1430 hrs AIAA-2020-2251 **Online Machine Learning Model Compensator for Model Predictive Control and Anomaly Mitigation of Mechanical Systems** S. Hong, University of South Carolina, Columbia, Columbia, SC; J. Cornelius, CFD Research Corporation (CFDRC), Huntsville, AL; Y. Wang, University of South Carolina, Columbia, Columbia, SC; K. Pant, CFD Research Corporation (CFDRC), Huntsville, AL	1500 hrs AIAA-2020-2252 **Parallel Real-Time Tracking and 3D Reconstruction with TBB for Intelligent Control and Smart Sensing Framework** T. Mkhoyan, C. de Visser, R. De Breuker, Delft University of Technology, Delft, The Netherlands			

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598-IS-22	**Cognitive Assistants (Invited)**					**Celebration 10**
Chaired by: D. SELVA, Texas A&M University						
1330 hrs AIAA-2020-2253 **Space mission design ontology: extraction of domain-specific entities and concepts similarity analysis (Invited)** A. Berquand, Y. Moshfeghi, A. Riccardi, University of Strathclyde, Glasgow, United Kingdom	1400 hrs AIAA-2020-2254 **Explanation Approaches for the Daphne Virtual Assistant (Invited)** A. Viros Martin, D. Selva, Texas A&M University, College Station, TX	1430 hrs AIAA-2020-2255 **Virtual Assistant for Anomaly Treatment in Long Duration Exploration Missions (Invited)** P. Dutta, O. Balcells-Quintana, A. Viros Martin, R. Whittle, P. Josan, N. Beebe, Texas A&M University, College Station, TX; et al.				

Friday, 10 January 2020						
599-MAT-16	**Nanostructured Materials II**					**Celebration 6**
Chaired by: G. ODEGARD, Michigan Technological University and M. MAIARU, University of Massachusetts Lowell						
1330 hrs AIAA-2020-2256 **Fabrication of Aerospace-grade Epoxy and Bismaleimide Matrix Nanocomposites with High Density Aligned Carbon Nanotube Reinforcement** A. Kaiser, Massachusetts Institute of Technology, Cambridge, MA; I. Albelo, University of California, Los Angeles, Los Angeles, CA; B. Wardle, Massachusetts Institute of Technology, Cambridge, MA	1400 hrs AIAA-2020-2257 **Effect of Nanoparticle Size on Fracture Behavior in Polymer Nanocomposites** S. Roy, T. Sohail, J. Bodiuzzaman, University of Alabama, Tuscaloosa, Tuscaloosa, AL	1430 hrs AIAA-2020-2258 **3D Structuring of Magnetoelastomers for Anisotropic Actuation Properties** Y. Atescan, N. Yamamoto, Pennsylvania State University, University Park, PA	1500 hrs AIAA-2020-2259 **Statistical Analysis of Effective Piezoresistivity of Carbon Nanotube Reinforced Polymer Nanocomposites from Electron Tunneling Effects** K. Talamadupula, G. Seidel, Virginia Polytechnic Institute and State University, Blacksburg, VA			

Friday, 10 January 2020						
600-MDO-22	**Topology and Shape Optimization II**					**Celebration 2**
Chaired by: J. DEATON, Air Force Research Laboratory and M. KULKARNI, Embry-Riddle Aeronautical University						
1330 hrs AIAA-2020-2260 **Multiscale Concurrent Multi-Objective Structural Optimization of a Goose Neck Hinge** R. Murphy, C. Imediegwu, R. Hewson, M. Santer, Imperial College London, London, United Kingdom; M. Muir, Airbus, Bristol, United Kingdom	1400 hrs AIAA-2020-2261 **Development of a Conditional Generative Adversarial Network for Airfoil Shape Optimization** G. Achour, W. Sung, O. Pinon-Fischer, D. Mavris, Georgia Institute of Technology, Atlanta, GA	1430 hrs AIAA-2020-2262 **Shape Optimization for Energy Harvesting Applications** S. Lahoti, M. Kulkarni, Embry-Riddle Aeronautical University, Daytona Beach, FL	1500 hrs AIAA-2020-2263 **Topology Optimization of Heat Sinks for High Efficiency Electronics Employing Simplified Convection Model** M. Reid, C. Sun, M. El Sayed, Carleton University, Ottawa, Canada			

Friday, 10 January 2020						
601-MST-17	**Human Factors, Perception, and Cueing**					**Bayhill 30**
Chaired by: D. KEATING, The Charles Stark Draper Laboratory, Inc. and J. SCHROEDER, Federal Aviation Administration						
1330 hrs AIAA-2020-2264 **Retention of Manual Control Skills in Multi-Axis Tracking Tasks** R. Wijlens, Delft University of Technology, Delft, The Netherlands; P. Zaal, NASA Ames Research Center, Moffett Field, CA; D. Pool, Delft University of Technology, Delft, The Netherlands	1400 hrs AIAA-2020-2265 **Manual Control Behavior in Stereoscopic Vision-Enhanced Depth Control Tasks** M. Kemna, D. Pool, Delft University of Technology, Delft, The Netherlands; M. Wentink, multiSIM B.V., Soesterberg, The Netherlands; M. Mulder, Delft University of Technology, Delft, The Netherlands	1430 hrs AIAA-2020-2266 **A U.S. Coast Guard Small Boat Recovery Study at NASA Ames Vertical Motion Simulator** N. Riccobono, Metis Technology Solutions, Inc., Albuquerque, NM; W. Chung, AMERICAN SYSTEMS Corporation, Chantilly, VA	1500 hrs AIAA-2020-2267 **SCOPE - Pilot Workload Estimation Using Control Response: Theoretical Development and Practical Demonstration** E. Bachelder, San Jose State University, San Jose, CA	1530 hrs AIAA-2020-2268 **Adaptive Hexapod Simulator Motion based on Aircraft Stability** P. Zaal, A. Popovici, San Jose State University, Moffett Field, CA; E. Lewis, Metis Technology Solutions, Inc., Moffett Field, CA	1600 hrs AIAA-2020-2269 **Simulator Experiments for Modeling Helicopter Pilot in Roll Tracking Task** M. Vrdoljak, University of Zagreb, Zagreb, Croatia; O. Halbe, T. Mehling, M. Hajek, Technical University of Munich, Munich, Germany	

Friday, 10 January 2020						
602-MST-18	**Special Modeling and Simulation Topics**					**Coral Spring II**
Chaired by: A. ELMILIGUI, NASA Langley Research Center and S. BHANDARI, Cal Poly Pomona						
1330 hrs AIAA-2020-2270 **Modeling Conservation of Angular Momentum for Robotic In-Space Assembly Systems** J. Friz, P. Kenney, J. Neuhaus, NASA Langley Research Center, Hampton, VA	1400 hrs AIAA-2020-2271 **Novel Approach Towards Energy Utilization: Repurposing Jet Turbine Wake Flow as a Mean of Renewable Energy Source for Airports** K. Turkoglu, xNorm, LLC, Los Gatos, CA; M. Toloui, Self, Minneapolis, MN	1430 hrs AIAA-2020-2272 **Triad of Trust: Protocols for Credible Modeling, Simulation and Analysis** T. Hurst, P. Turner, J. Jones, L. Schneider, Raytheon Company, Tucson, AZ	1500 hrs AIAA-2020-2273 **Modelling of induction heating of thermoplastic composites using microscopic level modeling** A. Patel, M. Ali, M. Van Tooren, University of South Carolina, Columbia, Columbia, SC	1530 hrs AIAA-2020-2274 **Macroscopic modelling of induction heating of thermoplastic composites using computational electromagnetism** M. Holland, University of Stuttgart, Stuttgart, Germany; M. Van Tooren, University of South Carolina, Columbia, Columbia, SC		

Friday, 10 January 2020						
603-PC-29	**Turbulent Combustion III**					**Bayhill 24**
Chaired by: P. PALIES, CFD Research Corporation and S. BARWEY						
1330 hrs AIAA-2020-2275 **Radiation and Emissions from Turbulent Premixed Jet A/Air Flames Diluted with Combustion Products** Z. Hoter, J. Bonebrake, D. Blunck, Oregon State University, Corvallis, OR	1400 hrs AIAA-2020-2276 **Effects of thermal stressing on the turbulent flame speed of jet fuel** A. Alkhalifa, J. Bonebrake, D. Blunck, Oregon State University, Corvallis, OR	1430 hrs AIAA-2020-2277 **Laminar and Turbulent Flame Properties with Uncertain Chemical Kinetics** S. Calello, T. Gallagher, Innovative Scientific Solutions, Inc., Dayton, OH	1500 hrs AIAA-2020-2278 **Development of a Diagnostic Damkohler Number for Interpreting Laser-Induced Fluorescence Data in Turbulent Flames** K. Beseler, A. Tyagi, J. O'Connor, Pennsylvania State University, University Park, PA	1530 hrs AIAA-2020-2279 **Chemical Explosive Mode Prediction using Machine Learning for Advanced Flame Diagnostics** C. Xu, O. Owoyele, P. Pal, P. Kundu, S. Som, Argonne National Laboratory, Lemont, IL		

Friday, 10 January 2020						
604-PC-31	**Spray and Droplet Combustion II**					**Bayhill 26**
Chaired by: Y. HARDALUPAS, Imperial College London and B. SFORZO, Argonne National Laboratory						
1330 hrs AIAA-2020-2280 **Effects of Cetane Number on High-Pressure Fuel Spray Characteristics with a Hot Surface Ignition Source** A. Motily, University of Illinois, Urbana-Champaign, Urbana, IL; J. Ryu, Army Research Laboratory, Aberdeen Proving Ground, MD; Y. Kim, University of Illinois, Urbana-Champaign, Urbana, IL; K. Kim, Army Research Laboratory, Aberdeen Proving Ground, MD; T. Lee, University of Illinois, Urbana-Champaign, Urbana, IL; C. Kweon, Army Research Laboratory, Aberdeen Proving Ground, MD	1400 hrs AIAA-2020-2281 **Optical Engine Study of Variable Energy Assisted Compression Ignition using a Glow Plug for Unmanned Aircraft Propulsion Systems** E. Amezcua Cuellar, D. Rothamer, University of Wisconsin, Madison, Madison, WI; K. Kim, C. Kweon, Army Research Laboratory, Aberdeen Proving Ground, MD	1430 hrs AIAA-2020-2282 **Interface-resolved DNS of Spray Vaporization and Combustion in Isotropic Turbulence** J. Palmore, Virginia Polytechnic Institute and State University, Blacksburg, VA	1500 hrs AIAA-2020-2283 **Effect of Transverse Acoustic Perturbation on the Liquid Sheet Breakup** S. Dighe, H. Gadgil, Indian Institute of Technology Bombay, Mumbai, India	1530 hrs AIAA-2020-2284 **Multiscale modelling of a doublet injector using hybrid VOF-DPM method** A. Balasubramanian, V. Kumar, P. Nakod, J. Schütze, A. Rajan, ANSYS, Inc., Canonsburg, PA		

Friday, 10 January 2020						
605-PGC-12	**Pressure Gain Combustion: Combustor Testing, Operability, and Performance III**					**Manatee Spring I**
Chaired by: J. STOUT, Aerojet Rocketdyne and J. REYES						
1330 hrs AIAA-2020-2285 **Equivalent Available Pressure Measurements on a Laboratory RDE** R. Fievisohn, National Academy of Sciences, Washington, D.C.; J. Hoke, Innovative Scientific Solutions, Inc., Dayton, OH; A. Holley, Air Force Research Laboratory, Wright-Patterson AFB, OH	1400 hrs AIAA-2020-2286 **Product Recirculation and Incipient Autoignition in a Rotating Detonation Engine** R. Fievisohn, National Academy of Sciences, Washington, D.C.; J. Hoke, Innovative Scientific Solutions, Inc., Dayton, OH; S. Schumaker, Air Force Research Laboratory, Wright-Patterson AFB, OH	1430 hrs AIAA-2020-2287 **Investigation of Longitudinal Operating Modes in Rotating Detonation Combustors** R. Bluemner, C. Paschereit, Technical University of Berlin, Berlin, Germany; E. Gutmark, University of Cincinnati, Cincinnati, OH; M. Bohon, Technical University of Berlin, Berlin, Germany	1500 hrs **Oral Presentation** **Rotating Detonation Engine Experimental Considerations** J. Stout, Aerojet Rocketdyne, Canoga Park, CA			

Friday, 10 January 2020						
606-SD-20	**Aeroelasticity II**					**Celebration 15**
Chaired by: C. BARNES, AFRL/RQVA and W. VILLERS						
1330 hrs AIAA-2020-2288 **Mode Switching Phenomenon on Variable Cant Angle Wingletted Wings** J. Mondragon, University of Maryland, College Park, College Park, MD; J. Hubbard, Texas A&M University, College Station, TX	1400 hrs AIAA-2020-2289 **Time Marching Aeroelasticity Modeling and Validation Study for Plates with and without Hole** H. Ran, T. Wray, S. Yang, H. Yang, CFD Research Corporation (CFDRC), Huntsville, AL	1430 hrs AIAA-2020-2290 **Analyzing the Dynamic Behavior of a High Aspect Ratio Wing Incorporating a Folding Wingtip** R. Cheung, D. Rezgui, J. Cooper, University of Bristol, Bristol, United Kingdom; T. Wilson, Airbus, Filton, United Kingdom				

Friday, 10 January 2020						
607-STR-18	**Innovative Concepts in Aircraft Structures II**					**Celebration 5**
Chaired by: Z. HU, The Boeing Company and C. SAGRILLO						
1330 hrs AIAA-2020-2291 **Reissner's Mixed Variational Theorem and Energy Reconstitution for Triangular Elements** V. Hong, E. Santarpia, L. Demasi, San Diego State University, San Diego, CA	1400 hrs AIAA-2020-2292 **Shanley--Ryder Failure Concepts, Deterministic Margins And Factors Of Safety,Failure Probabilities; Wavelet Structural Health Monitoring** H. Hilton, University of Illinois, Urbana-Champaign, Urbana, IL	1430 hrs AIAA-2020-2293 **Characterizing the Structural Properties of Insect Wing Structural Analogues for Replacement of Orthotropic Structures in Damage Tolerant Aircraft Applications** M. Bakowski, K. Radford, C. Merrett, Clarkson University, Potsdam, NY	1500 hrs AIAA-2020-2294 **Analytical and Experimental Assessment of the Viscoelastic Time-Temperature Superposition Principle for a Thermo-Viscoelastic Wing Spar** J. Adams, C. Merrett, Clarkson University, Potsdam, NY	1530 hrs AIAA-2020-2295 **Assessment of crack path uncertainty using 3D FEA and Response Surface Modeling** A. Loghin, Simmetrix, Inc., Clifton Park, NY; S. Ismonov, Jacobs, Houston, TX		

Friday, 10 January 2020						
608-UAS-13	**Unmanned Systems Mission Management, Coordination, Planning, and Autonomy III**					**Celebration 16**
Chaired by: M. LOGAN, NASA Langley Research Center						
1330 hrs AIAA-2020-2296 **Nested Vehicle Routing Problem: Combined Operations of UAV and Ground Vehicle** F. Zeng, Z. Chen, H. Nikoue, J. Magalhaes, J. Clarke, Georgia Institute of Technology, Atlanta, GA	1400 hrs AIAA-2020-2297 **Simulation to Determine the Sensor Requirements for UAV Perching through Evaluating the Impacts of Sensor and Hook Configuration on Perching Maneuvers** J. Browne, J. Wilhelm, Ohio University, Athens, OH	1430 hrs AIAA-2020-2298 **Autonomous Architecture for UAV-based Agricultural Survey** S. Mondal, A. Williamson, Z. Xu, A. Tsourdos, Cranfield University, Cranfield, United Kingdom	1500 hrs AIAA-2020-2299 **Energy-Optimal Trajectory Planning of Hybrid Ultra-Long Endurance UAV in Time-Varying Energy Fields** V. Dobrokhodov, K. Jones, C. Walton, I. Kaminer, Naval Postgraduate School, Monterey, CA			

Friday, 10 January 2020		
609-NW-18 **1530 - 1600 hrs**	**Friday Afternoon Networking Coffee Break**	**Celebration and Regency Foyers**

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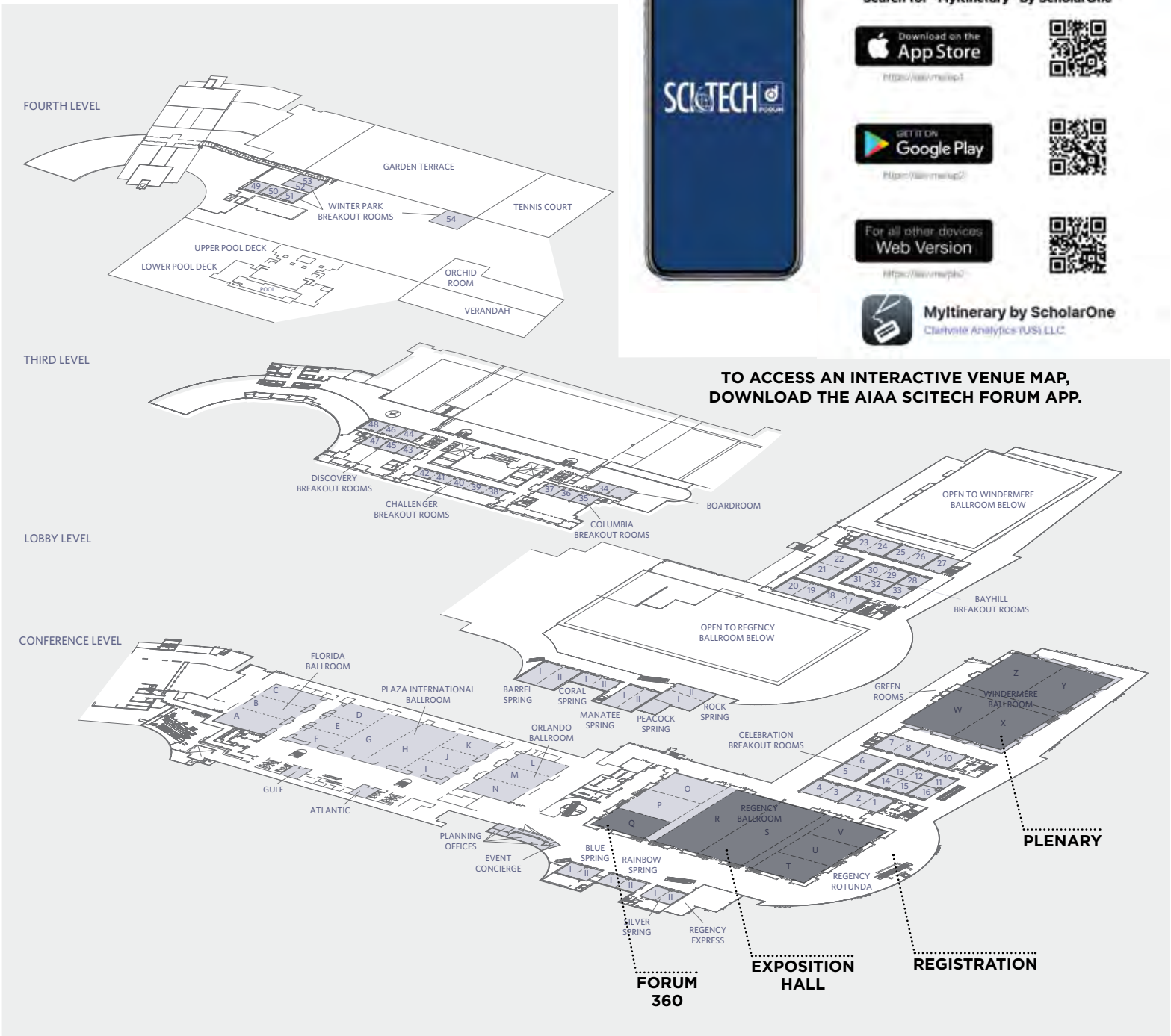

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