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Speaker Expense Reimbursement & Distinguished Lecture Programs

Having trouble finding a speaker for your monthly program or for your end of year banquet? Hopefully, the Distinguished Lecture Program (DL) or the new Speaker Expense Reimbursement Program can help. Since 1969, the DL program has been helping section officers meet the needs of their members. The program grew from helping small sections to helping very large sections and student branches with their program and events.

AIAA introduced a new program, the Speaker Expense Reimbursement Program, to complement the current DL Program.

Both Programs are available to the Sections and Student Branches. A Section may have up to two speakers per year and a Student Branch may have one speaker per year, as long as funds are available. The program year runs from October 1–September 30. The speaker(s) may come from the Distinguished Lecture list or the speaker's expenses can be reimbursed through the new Speaker Expense Reimbursement Program. Here are the details of each program:

Introduction to the Speaker Expense Reimbursement Program

This program allows Student Branches and Professional Sections the opportunity to arrange for a speaker of their choice for a Branch and Section event. The AIAA will cover reasonable speaker travel expenses, provided the Branch or Section adheres to the following guidelines and procedures.

1. The Professional Section or Student Branch contacts the speaker they would like to invite, and they agree upon a tentative date and time for the speaking event.

2. The Professional Section or Student Branch must then obtain authorization from the AIAA Program Administrator before the speaker is confirmed and before any nonrefundable expenses are committed. For authorization, e-mail Emily Springer at emilys@aiaa.org.

Provide the following information:

- Section or Branch making request
- Name of the speaker, the speaker's telephone number, e-mail, and mailing address
- Topic of the lecture or talk
- Date of the event the speaker is requested
- Estimated speaker travel expenses, to include airfare, hotel, rental car, and other associated travel expenses

3. After approval is secured from the AIAA Program Administrator, the Professional Section or Student Branch may confirm the speaker's invitation. At this time, travel expenses can be incurred for the speaker's transportation to the Section or Branch.

4. When the invitation is confirmed, a letter must be sent by the Section or Branch representative confirming the invitation and acceptance. Additionally, a copy of the letter must be sent to the AIAA Program Administrator. These letters may be done electronically.

The letter of invitation must include the following information:

- Section or Student Branch
- Location of Event
- Date of Event
- Time of Event
- Section Representative; name, phone, e-mail address

• The letter of invitation must include a paragraph stating the following:

> "AIAA will be pleased to reimburse you for reasonable travel expenses including airfare, hotel room night charges, meals, rental cars, parking expenses both at the hotel and departure airport, and other associated expenses related to your travel to the engagement. AIAA does not pay per diem or honoraria. Expense report with receipts must be submitted directly to Emily Springer, AIAA, 1801 Alexander Bell Drive, Suite 500, Reston, VA 20191."

Lecturers, like the rest of us, are busy people and often cannot schedule as far ahead as requestor might like. The speakers are usually full-time employees of an organization and have very demanding schedules. The appropriate time to contact a lecturer is no more than three months and no less than one month before the requested date of the invitation.

5. When the AIAA Program Administrator receives the Letter of Invitation, the Distinguished Lecturer Calendar will be updated. The Distinguished Lecturer Calendar is capable of noting all of the information from item 6, and it is capable of having attachments linked to the event should the section have a flyer for the event (see sample calendar listing).

The DL Calendar is a Web calendar hosted at: **https://info.aiaa.org/SC/RSAC/Lists/Calendar/**.

Introduction to the Distinguished Lecture Program

The Distinguished Lecture Program offers Professional Sections and Student Branches the opportunity to select a speaker from a pre-screened list of speakers who have agreed to participate in this program. The Speakers are often considered experts on a specific topic. Oftentimes these speakers have won national awards.

To arrange for a Distinguished Lecturer for your Section or Branch, please do the following:

1. Review the list of speakers and their topics.

2. Check the Distinguished Lecture Calendar. The calendar is located under My AIAA, My Section. Check the calendar to see if the Distinguished Lecturer is already committed. If the speaker is already booked, the calendar will also note the Section or Branch hosting the lecture. If it is a nearby section or branch, perhaps you can arrange for a visit before or after.

3. The Professional Section or Student Branch contacts the speaker they would like to invite, and they agree upon a tentative date and time for the speaking event.

4. The Professional Section or Student Branch must then obtain authorization from the AIAA Program Administrator before the speaker is confirmed and before any nonrefundable expenses are committed. For authorization, e-mail Emily Springer at emilys@aiaa.org.

Provide the following information:

• Section or Branch making request

• Name of the speaker

• Date of the event the speaker is requested

• Estimated speaker travel expenses, to include airfare, hotel, rental car, and other associated travel expenses

5. After approval is secured from the AIAA Program Administrator, the Professional Section or Student Branch may confirm the speaker's invitation. At this time, travel expenses can be incurred for the speaker's transportation to the Section or Branch.

6. When the invitation is confirmed, a letter must be sent by the Section or Branch representative confirming the invitation and acceptance. Additionally, a copy of the letter must be sent to the AIAA Program Administrator.

The letter of invitation must include the following information:

• Section or Student Branch

• Location of Event

• Date of Event

• Time of Event

• Section Representative; name, phone, e-mail address

• The letter of invitation must include a paragraph stating the following:

> "AIAA will be pleased to reimburse you for reasonable travel expenses including airfare, hotel room night charges, meals, rental cars, parking expenses both at the hotel and departure airport, and other associated expenses related to your travel to the engagement. AIAA does not pay per diem or honoraria. Expense report with receipts must be submitted directly to Emily Springer, AIAA, 1801 Alexander Bell Drive, Suite 500, Reston, VA 20191."

Lecturers, like the rest of us, are busy people and often cannot schedule as far ahead as requestor might like. The speakers are usually full-time employees of an organization and have very demanding schedules. The appropriate time to contact a lecturer is no more than three months and no less than one month before the requested date of the invitation.

7. When the AIAA Program Administrator receives the Letter of Invitation, the distinguished Lecturer Calendar will be updated. The Distinguished Lecturer calendar is capable of noting all of the information from item 6, and it is capable of having attachments linked to the event should the section have a flyer for the event (see sample calendar listing).

The DL Calendar is a Web calendar hosted at: **https://info.aiaa.org/SC/RSAC/Lists/Calendar/**.

Sample Letter of Invitation

<INSERT Month, Day, Year>
<INSERT Recipient, Title>
<INSERT Organization>
<INSERT Street Address>
<INSERT City, State Zip Code>
Dear <INSERT Recipient>:

Thank you for accepting this invitation to speak for the AIAA **<INSERT Section/Branch>**.

To confirm the date and place:
Location of Event: **<INSERT Section/Branch>**
Date: **<INSERT Month, Day, Year>**
Time: **<INSERT Time>**
Section Officer: **<INSERT Name>**
<INSERT Phone Number>
E-mail: **<INSERT Address>**

We are delighted you have accepted our invitation to speak on this date. I will be contacting you shortly to finalize arrangements, provide you with information and suggestions on local hotels, offer to assist you with any requirements you may have, and inform you of other specifics about the event. Please advise me of your audiovisual needs for the lecture.

AIAA will be pleased to reimburse you for reasonable travel expenses including airfare, hotel room night charges, meals, rental cars, parking expenses both at the hotel and departure airport, and other associated expenses related to your travel to the engagement. **AIAA does not pay per diem or honoraria**. Expense report with receipts must be submitted directly to Emily Springer, 1801 Alexander Bell Drive, Suite 500, Reston, VA 20191, email emilys@aiaa.org, fax 703-264-7551.

Sincerely,
<INSERT Sender, Title>
cc:
Emily Springer, AIAA emilys@aiaa.org

AIAA Distinguished Lecture and Speaker Reimbursement Program
Expense Reimbursement Policy

Reimbursement for expenses will be made in accordance with IRS regulations, which specify that no deduction be allowed by an organization for travel can be made unless all of the following elements can be substantiated by adequate records:

1. The amount of the expenditure
2. The date and place of the travel or expense
3. The business purpose of the expenditure
4. Receipt showing actual dollar amount and detail of the bill

Specifying the section or student branch at which you lectured, and the date, will satisfy the business purpose requirement, and most receipts will show the date and place. Receipts for cash with no receipt, such as tips, will need to be noted on the expense report.

AIAA is not obligated to reimburse any expense that fails to meet these criteria, unless otherwise noted in these guidelines.

Careful adherence to the guidelines stated herein will assure minimum delay in processing and payment of expenses and prevent employees from incurring questionable expenses for which they may be held personally responsible.

Receipts and a total, using the reimbursement form if preferred, must be submitted within 30 days after the completion of a program. Reimbursement may be expected within 15 business days after AIAA receives the request form. The following is a guide for permissible travel expenses that would be covered under AIAA's travel policy. The speakers should make their own travel arrangements; however, airfare and hotel may be made through AIAA if preferred. Please contact Emily Springer at emilys@aiaa.org for more details.

Reasonableness of an expense and the business necessity of any expense are at the discretion of AIAA, not the individual. If you have questions about whether an item is reimbursable or questions regarding this policy, please contact Emily Springer at AIAA Headquarters, emilys@aiaa.org or 703/264-7533.

AIAA does not pay per diem, honoraria, or processing fees for expense reports.

ALLOWABLE EXPENSES

Air Transportation

AIAA will reimburse round-trip fares for reasonable amounts, but does not pay business or first-class fares. Upgrades to Economy Plus or similar are allowed. Luggage fees will be paid as needed but due to the shortness of trips, AIAA asks that luggage only be checked if absolutely necessary due to the increasing costs.

Ground Transportation

Ground transportation to and from airports and train stations by personal vehicle, taxi or shuttle bus service is reimbursable, as well as parking at the airport for two nights, or one more than the nights of speaker engagements (for example, if you are speaking in one venue, AIAA will pay for two nights of parking, if you are speaking over two days, AIAA will pay for three nights. If your trip is of longer duration exceptions will be made at the time of the request approval). Mileage should be calculated using Google Maps or similar and that map may be submitted as a receipt.

Personal Vehicle

Use of a personal vehicle to and from the program site will be reimbursed at the rate of 55.5 cents per mile (or the equivalent of the mileage stimulated by IRS regulations at the time of the lecture), plus tolls

and parking charges, with the total amount not to exceed the equivalent round-trip economy airfare.

Parking & Tolls
Airport, hotel or other parking lot expenses will be reimbursed for the period that you were on AIAA business and complying with the other conditions of your travel.

Rental Car
The rental car should be that of an economy car. A receipt must be submitted to AIAA for reimbursement. Reimbursement will be made for the number days of AIAA travel.

Accommodations
Hotel room, tax, and reasonable phone and internet charges are reimbursable. AIAA will reimburse for only one hotel night more than the duration of your lecture, i.e., two nights for a one-night lecture. Any special arrangements or extenuating circumstances must be made in advance with AIAA. Uncontrollabe circumstances, such as weather, will be accommodated as needed.

Meals
Instructors are entitled to reasonable meals while traveling. Expenses must be itemized for breakfast, lunch and dinner. Receipts are required for all meals and beverages of any amount.

Tips & Gratuities
No receipst are needed, but all tips should be recorded on the expense report separately by day.

This list is by no means all-inclusive and other incurred expenses not previously categorized will be judged on their own merits.

A Note about Government speakers, and NASA in particular

There are many excellent speakers out there who currently work for NASA or other federal agencies who could be invited to speak under AIAA's Speaker Expense Reimbursement Program (SERP).

Government employees' travel is regulated under the U.S. Code, and the current wording can be seen here: http://www.law.cornell.edu/uscode/text/31/1353 and here: http://www.law.cornell.edu/uscode/text/5/4111.

Some NASA centers and other agencies interpret the code as not allowing employees to accept reimbursement for travel on behalf of their agency.

So what does this mean for the sections and branches?
Sections are welcome to, and encouraged, to invite speakers from NASA and other Federal agencies to use the SERP in order to come to a section to speak. As with all Distinguished Lectures and invited SERP speakers, it is incumbent upon the speaker and his or her agency to work within AIAA's policies for reimbursement. This means that AIAA will not pay per diem, and will not pay a speakers' bureau or third party fee for processing of payment. Reimbursements are done by check only.

AIAA is willing to make airplane and hotel reservations on behalf of the speaker, and pay them directly, but other expenses that are incurred must be reimbursed afterward (rental car companies, for example, do not allow us to pay for someone else).

Some agencies are willing to pay partial or even full expenses of speakers; this is nice for AIAA but of course not necessary as AIAA is willing to pay all reasonable travel expenses.

Most likely this will mean that you will not be able to request an astronaut through the NASA Astronaut Bureau. If your section would like to have an astronaut speak, there are many former astronauts who are interesting and lively speakers and AIAA is willing to work with you on finding someone.

Tips to Help Make Sure the Meeting Will Be a Success

Speaker

• Confirm the date and tell the speaker about your meeting plans.

• How large a group and what type of audience?

• Provide the speaker with the time and place of the event.

• Would you like to have him/her talk to a student branch during the visit?

• Tell the speaker if you have a special purpose or anniversary on the program night.

• Do you need a picture and biographical information about the speaker for your publicity?

• Ask for an introduction.

• Tell the lecturer how long you want the presentation to last.

• Ask the speaker what equipment will be needed; projector, screen, display table, pointer, microphone, and lectern?

• Ask when and how the speaker will arrive. Is the speaker bringing a spouse?

• Offer assistance with travel plans.

• Suggest a moderately priced hotel and offer to make his/her reservations.

• The speaker is your guest. Although a rental car is paid for, you could instead offer to have someone drive the speaker to and from the airport.

Planning

• Carry out the wishes of the speaker and rent or borrow projectors and large screens. Confirm with the hotel/restaurant that certain equipment, chairs, and so forth will be available on the night you want, in the room you rent. Get the room name/number in writing so that you won't be moved to another one that might be unsuitable.

• Write several paragraphs about the speaker in time for your newsletter announcing the meeting. It is very important to properly advertise for the Distinguished Lecture. Members will attend if you tell them in an interesting manner about the presentation and the speaker. Send a copy of the newsletter to your lecturer.

• Assign someone (or yourself) to be the liaison to the speaker. This should be a person who is available for phone calls and transportation during the speaker's visit. Send this person's name and phone number to the speaker in case you're not available.

Meeting Day

• Meet the speaker at the airport if needed. If she/he is interested, arrange a tour of a company, the city, or an outstanding tourist attraction.

• The meeting room should be inspected one hour before the meeting. Check the microphone, the projector, and the screen. Do they all operate correctly?

The Meeting

• Before the meeting, you should call the speaker to accompany him/her to the meeting, even if it's just from the room upstairs. The speaker is your guest. Stay with the speaker in case something extra is needed. The speaker will probably want to check out the microphone and projector. Introduce the speaker to Section Officers and members so that he/she feels at home with the audience.

• When you are ready for the presentation, introduce the speaker using a script approved by him/her. The lecturer's name should be the last thing you say at the end of your introduction. One or two minutes are plenty. Your introduction must be a build-up. Describe the speaker and why he/she is qualified to speak on this subject. A strong introduction is always in order to warm up the audience. Start the applause yourself after the introduction.

After the Talk

• Present a plaque or some memento to the speaker. Stay with the speaker as he/she will be one of the last to leave. Help get the presentation equipment together. If no meal is served, ask if the speaker needs a beverage or a bite to eat. Remember that the speaker is in your care.

The Next Day

• Offer to take him/her to the airport. Thank the speaker for coming. Write a follow-up letter thanking the lecturer for addressing the Section. Let him/her know what the members thought about the talk. The speaker will truly appreciate your thoughtfulness.

• Your speaker is spending a day or two away from family to entertain your Section or Branch; therefore he/she should be treated as an honored guest.

RAMESH K. AGARWAL

Email: agarwalr@seas.wustl.edu

Biography:

Professor Ramesh K. Agarwal is the William Palm Professor of Engineering and the director of Aerospace Engineering Program and Aerospace Research and Education Center at Washington University in St. Louis. From 1994 to 2001, he was the Sam Bloomfield Distinguished Professor and Executive Director of the National Institute for Aviation Research at Wichita State University in Kansas. From 1978 to 1994, he worked in various scientific and managerial positions at McDonnell Douglas Research Laboratories in St. Louis. He became the Program Director and McDonnell Douglas Fellow in 1990.

Dr. Agarwal received his Ph.D in Aeronautical Sciences from Stanford University in 1975, M.S. in Aeronautical Engineering from the University of Minnesota in 1969 and B.S. in Mechanical Engineering from Indian Institute of Technology, Kharagpur, India in 1968.

Over a period of 35 years, Professor Agarwal has worked in Computational Fluid Dynamics (CFD), Computational Magnetohydrodynamics (MHD), Computational Aeroacoustics, Multidisciplinary Design and Optimization, Rarefied Gas Dynamics and Hypersonic Flows, Flow Control, and Renewable Energy. For the past ten years, he has devoted his efforts to renewable energy systems and issues related to sustainable air and ground transportation.

Dr. Agarwal is the author and coauthor of over 300 publications and serves on the editorial board of sixteen journals. He has given many plenary, keynote and invited lectures at various national and international conferences worldwide. Professor Agarwal continues to serve on many professional, government, and industrial advisory committees.

Abstract: "**Sustainable (Green) Aviation: Challenges and Opportunities"**

Air travel continues to experience the fastest growth among all modes of transportation. Therefore the environmental issues such as noise, emissions and fuel burn (consumption), for both airplane and airport operations, have become important for energy and environmental sustainability. This lecture provides an overview of issues related to air transportation and its impact on environment followed by topics dealing with noise and emissions mitigation by technological solutions including new aircraft and engine designs/technologies, alternative fuels, and materials as well as examination of aircraft operations logistics including Air-Traffic Management (ATM), Air-to-Air Refueling (AAR), Close Formation Flying (CFF), and tailored arrivals to minimize fuel burn. The ground infrastructure for sustainable aviation, including the concept of „Sustainable Green Airport Design" is also covered.

Abstract: "General Aviation: Past, Present and Future"

General Aviation industry has a century old history since the first flight of Wright brothers. Around 1935, the aviation industry began to separate into basically three categories based on its market: the mass public transportation, business transportation and personal transportation. The world "General Aviation" in the modern context includes the personal and business transportation. This talk will provide the audience an exhilarating tour of major technological developments in general aircraft since 1905 including the pioneering designers, entrepreneurs and famous pilots. It will also include the recently built small aircrafts for personal transportation developed as a result of push from NASA AGATE/SAT program. It will also cover the history of flying cars/roadables.

Abstract: "Impact of Computational Aerosciences on the Analysis and Design of Air and Space Vehicles"

Modeling and simulation have now become an integral part of the analysis and design in aerospace industry. Over last four decades, many of the computational tools have been developed that have become reasonably mature that they are now routinely employed in the multidisciplinary analysis, design and optimization of air and space vehicles.

This lecture will describe the state of the art in Computational Fluid Dynamics (CFD), Computational Structural Dynamics (CSD), Computational Electromagnetics (CEM), Flight Mechanics and Control (FMC) and Multidisciplinary Design and Optimization (MDO) with particular emphasis on real world applications to transport and military aircraft, missile and launch vehicles, helicopters, and hypersonic vehicles. The examples will include currently flying vehicles and the proposed future vehicles such as BWB.

JOHN ANDERSON, JR.

E-mail: AndersonJA@si.edu

Biography:

Dr. John Anderson, Jr. was born in Lancaster, Pennsylvania on October 1, 1937. He attended the University of Florida, graduating in 1959 with High Honors and a Bachelor of Aeronautical Engineering Degree. From 1959 to 1962, he was a Lieutenant and Task Scientist at the Aerospace Research Laboratory at Wright-Patterson Air Force Base. From 1962 to 1966,he attended the Ohio State University under the National Science Foundation and NASA Fellowships, graduating with a PhD in Aeronautical and Astronautical Engineering. In 1966, he joined the U. S. Naval Ordnance Laboratory as Chief of the Hypersonic Group. In 1973, he became Chairman of the Department of Aerospace Engineering at the University of Maryland, and since 1980 has been a professor of Aerospace Engineering at Maryland. In 1982, he was designated a Distinguished Scholar/ Teacher by the university. During 1986–87, while on sabbatical from the university, Dr. Anderson occupied the Charles Lindbergh chair at the National Air and Space Museum of the Smithsonian Institution. He continued with the Air and Space Museum one day each week as their Special Assistant for Aerodynamics, doing research and writing a book on the history of aerodynamics. In addition to his position as professor of aerospace engineering, in 1993 he was made a full faculty member of the Committee for the History and Philosophy of Science and in 1996 an affiliate member of the History Department at the University of Maryland. In 1996 he became the Glenn L. Martin Distinguished Professor for Education in Aerospace Engineering. In 1999 he retired from the University of Maryland and was appointed Professor Emeritus. He is currently the Curator for Aerodynamics at the National Air and Space Museum, Smithsonian Institution.

Dr. Anderson has published ten books: *Gasdynamic Lasers: An Introduction, Academic Press* (1976), and under McGraw Hill, *Introduction to Flight, 1st Edition* (1978), *2nd Edition*, (1985), *3rd Edition* (1989), *4th Edition* (2000), *5th Edition* (2005), *Modern Compressible Flow, 1st Edition* (1982), *2nd Edition* (1990), *3rd Edition* (2002), *Fundamentals of Aerodynamics, 1st Edition* (1984), *2nd Edition* (1991), *3rd Edition* (2001), *4th Edition* (2007), *Hypersonic and High Temperature Gas Dynamics* (1989), *Computational Fluid Dynamics: The Basics with Applications* (1995), *A History of Aerodynamics and Its Impact on Flying Machines*, Cambridge University Press, 1997, *Aircraft Performance and Design*, McGraw-Hill, 1999, *The Airplane: A History of Its Technology, American Institute of Aeronautics and Astronautics*, 2002, and *Inventing Flight; The Wright Brothers and Their Predecessors*, The Johns Hopkins University Press (2004). He is the author of over 120 papers in radiative gasdynamics, re-entry aerothermodynamics, gasdynamic and chemical lasers, computational fluid dynamics, applied aerodynamics, hypersonic flow, and the history of aeronautics. Dr. Anderson is in *Who's Who in America*. He is an Honorary Fellow of the American Institute of Aeronautics and Astronautics (AIAA), and a Fellow of the Royal Aeronautical Society, London. He is also a Fellow of the Washington Academy of Sciences, and a member of Tau Beta Pi, Sigma Tau, Phi Kappa Phi, Phi Eta Sigma, the American Society for Engineering Education, the History of Science Society, and the Society for the History of Technology. In 1988, he was elected as Vice President of AIAA for Education. In 1989, he was awarded the John Leland Atwood Award jointly by the American Society for Engineering Education and the American Institute of Aeronautics and Astronautics "for the lasting influence of his recent contributions to aerospace engineering education." In 1995, he was awarded the AIAA Pendray Aerospace Literature Award "for writing undergraduate and graduate textbooks in aerospace engineering which have received worldwide acclaim for their readability and clarity of presentation, including historical content." In 1996, he was elected Vice President of AIAA for Publications. He has recently been honored by AIAA with its 2000 von Kármán Lectureship in Astronautics, and with its History Book Award in 2002 for a History of Aerodynamics. Also in 2002, he was awarded the position of Honorary Fellow of AIAA, the Institute's highest award. He has recently become a member of the National Academy of Engineering.

Dr. Anderson is active and known for his professional and educational activities both nationally and internationally. He has given over 40 short courses to the major aerospace companies, the Air Force Academy, the government, and in Europe at Rolls-Royce in England, and the von Kármán Institute in Belgium. This includes a pioneering hypersonic aerodynamic course jointly sponsored by AIAA and the University of Maryland and televised live nationally by satellite. In terms of the publishing world, in 1987 McGraw-Hill chose Dr. Anderson to be the senior consulting editor on the McGraw-Hill Series in Aeronautical and Astronautical Engineering.

Abstract: "The Race for the First Flight: Langley and the Wright Brothers."

Almost everybody knows something about the Wright Brothers, and their successful flight on 17 December 1903. However, it is less known that they were in a race with Samuel Pierpont Langley, 3rd Secretary of the Smithsonian, to achieve the first successful piloted, powered, heavier-than-air-flight. The story of this race is told, detailing side-by-side the work and progress of both Langley and the Wrights. In the process, the presentation gives the early history of the invention of the airplane, going back to the 15th century, and leading up to the Wrights' spectacular success on the sand dunes of Kill Devil Hill on that fateful December 17th.

Abstract: "Breaking the Sound Barrier: The Aerodynamic Breakthroughs that Made It Possible."

This is one of the most exciting stories from the history of aerodynamics. It is a short history of how our intellectual understanding of shock waves and compressibility effects evolved, and how we finally learned the source of the aerodynamic "bad" things that happened when airplanes approached the speed of sound. It highlights the early research done by the NACA on the understanding of compressibility effects on lift and drag, and how this research had an impact on the breaking of the sound barrier by the Bell X-1.

Abstract: "Aesthetics – Does It Play a Role in Airplane Design?"

There is an old adage that an airplane that looks beautiful will fly beautifully. Although true only some of the time, the question is raised as to what extent, if any, aesthetics affects the mind of the airplane designer during his or her design process? Truly, many airplanes are aesthetically beautiful machines. Is this just a coincidence, or is it due to some underlying role of aesthetics during their design. Using a brief review of the progress in airplane design in the 20th century as a foundation, and focusing on some of the truly beautiful airplanes that have been designed over the years, this presentation explores that question.

Abstract: "The Evolution of Airplane Design in the Twentieth Century."

This is a survey of the evolution of the airplane and some of its technical features over the last 100 years. It is somewhat based on John's book *The Airplane; A History of Its Technology*, published by the AIAA in 2003.

Abstract: "Wings in the National Air and Space Museum."

This is a kind of virtual tour of several galleries in the Air and Space Museum, including the early technical evolution of airfoil shape and wing shape as seen in the airplanes in the Museum. Most people come into the Museum and have a "gee whizz" experience. See how you can come into the Museum and also see the history of aeronautical engineering technology in front of you if you know what you are looking for!

GENE AUSTIN

E-mail: X33Mgr@mac.com

Biography

Following his retirement from NASA, after a career of nearly 42 years, Gene and his wife (Judith) formed a company, GJ Systems, Inc. The company provides Systems Consulting and Seminars in the area of Space Transportation. During the period following his retirement, Gene has consulted with NASA on the National Launch System, Human Mars Mission approaches, and the ARES Launch Vehicle Program. He was also a regular contributor to the NASA Business Education Program since the X-33 was a key element in NASA's Business Development approach of the pre-2000 time frame.

Gene's position prior to his retirement from NASA was the NASA X-33 Program Manager. He located his Program Office at the Lockheed Martin Skunk Works in Palmdale, CA, where the design and development effort took place. The X-33 Program was a unique new approach in development of Space Programs by NASA. It was a Partnership between NASA and Industry. The X-33 Program had as its primary goal, to demonstrate the technologies necessary to reach a decision to commercially develop and operate a Single Stage to Orbit Reusable Launch Vehicle. Gene was elected to the rank of AIAA Associate Fellow in May 1989 and has served on the AIAA Electric Propulsion and Space Transportation Technical Committees.

Other key positions during his career include: Director of the Space Transportation and Exploration Office, Deputy Director of the Advanced Transportation Technologies Office and Manager of the Aeroassist Flight Experiment Project at the NASA Marshall Space Flight Center in Huntsville, Alabama. He also served as Director of the Advanced Transportation Branch of the NASA Headquarters Office of Space Flight in Washington, DC. His assignment in 1993 as NASA lead of the Advanced Technology Team of NASA's Access to Space Study, led to establishment of the agency's goal toward the development of an operational Single Stage To Orbit. As a result of that goal, and working with the DoD and the White House Office of Science and Technology Policy, NASA was then assigned the responsibility for Reusable Launch Vehicle technology development and demonstration in the Administration's August 1994 National Space Transportation Policy. He received a Bachelor of Science in Aerospace Engineering from Auburn University in 1963. Mr. Austin did graduate studies in Engineering Mechanics at the University of Alabama in Huntsville.

Background

After graduation from Auburn University, he returned to the NASA Marshall Space Flight Center (MSFC) where he had participated in the Cooperative Education Program during his college years. He served in progressively increasing job responsibilities over his career at MSFC from a specialist who performed theoretical investigations in mission analysis and conceptual designs of nuclear rocket systems to his present assignment. Some of the key assignments in his career include:

- Director, Space Transportation and Exploration Office within Program Development at MSFC
- Acting Chief, Advanced Development Branch within Advanced Programs of the Office of Space Flight, NASA Headquarters;
- Served on the NASA Headquarters negotiation team leading to the Agreement between NASA and Orbital Sciences Corporation for the commercial development of the Transfer Orbit Stage;
- Chief of MSFC's Space Transportation Group within Program Development;
- Manager of the Aeroassist Flight Experiment Project;
- Deputy Manager, Space Transportation Study Team;
- Acting Chief, Advanced Transportation Branch in the NASA Headquarters Office of Space Flight's Advanced Program Development Division;
- Chairman, NASA Advanced Technology Option Team of the NASA Access to Space Study.

Abstract: "Private Space Transportation Systems are Demonstrating Capabilities Necessary for Vital Roles in Space Access"

The private sector has succeeded in space flight operations following the X-Prize. This is proving that they can take up a challenge and succeed. Most assumed that a $10M Prize would be insufficient to motivate

companies to compete for a mission that barely skirts the defined boundary of “Outer Space.” Paul Allen and Burt Rutan, however, saw a revolutionary opportunity to be seized by this challenge. With an investment of approximately $25M by Paul Allen, and Burt Rutan’s vision that his Scaled Composites company could indeed succeed, they entered the competition and won that prize.

Later, Robert Bigelow of Bigelow Aerospace in Las Vegas, NV established the “America’s Space Prize” of $50M for the first team that can send five passengers to a 400km (250 miles) orbit and be able to complete at least two full orbits prior to return to Earth. Most of us think the amount is too low to seriously attract the kind of investment required for this kind of capability. Sounds like the general reaction to the X-Prize nearly a decade earlier.

SpaceX, with its Falcon 9 and their Dragon Spacecraft has demonstrated that he private sector can achieve the capability to get cargo and passengers to low Earth Orbit, particularly to the ISS. NASA can pursue the goal of going back to the moon and beyond. This is a significant challenge, but the rewards are great for both NASA and the Private Sector. NASA’s Orion, for example could be focused on returning from the moon and the new orbital venture can have a startup market assured: ISS Crew rotation, Cargo resupply and transportation to Private Space Hotels, e.g. Robert Bigelow’s.

Finally, NASA has a mission to Pluto underway that was launched in 2006 that will arrive in 2015. If we are to have spacecraft exploring new regions in that realm of our solar system and beyond, advances in propulsion technology are required to permit these missions to be completed in less than the typical career of scientists that plan the mission.

Abstract: “Space Tourism, Moon – Mars and Beyond”

The key to expand Space Travel “for the rest of us” is to get safe, reliable and low cost transportation to Low Earth Orbit. Now that the Space Race is over we settle into a pace that suits our national priorities. However, the Chinese, Russia and Europe are potential threats to our being “settled in to a pace that suits our national priorities.” An emerging commercial sector is one that began with Space Adventures’ arrangement with the Russians to fill a vacant seat in their Soyuz Capsule for $20+ M that also includes a week on the ISS. Once the X-Prize win by Paul Allen and Burt Rutan’s SpaceShipOne was accomplished, Sir Richard Branson formed a new company, “Virgin Galactic.” This enterprise contracted with Paul Allen and Burt Rutan to build a larger version of SpaceShipOne, which can take six passengers and a crew of two for a five-minute zero-G experience above the defined altitude of 100Km, where “Space begins.” Once this begins, the number of “Astronauts” will expand by at least six per flight for only $200K per passenger. At the moment, several thousand potential new “Astronauts” have signed up. In addition, there are several new entities vying to capture a portion of this emerging market. At this time attention is now moving toward commercial flights to low Earth orbit and even beyond! NASA has initiated implementation of their plan. The Crew/Cargo Capsule “Orion,” by Lockheed Martin, will transport crews to the International Space Station.

On January 19, 2006, the New Horizons Pluto-Kuiper Belt spacecraft was launched and with the gravity assist of Jupiter, will arrive at Pluto in 2015. The current best technology that permits exploration of our outer solar system, is a Jupiter gravity assist! This is the first attempt to observe the planet Pluto and other objects in the Kuiper Belt (objects beyond the orbit of Neptune). We have done the easy part of exploring our Solar System. New propulsion technologies are required if the remainder will become possible with reasonable travel times. The current transportation technologies that are being pursued by NASA to achieve the further exploration of the planets include: Nuclear; advanced Chemical; Solar Thermal and Electric; Solar Sails; Electromagnetic Propulsion, and others. A balanced investment in the New Initiative, science and advanced technologies must be attained if we want to continue as the leader in Space Exploration.

PAUL BEVILAQUA

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Biography:

Dr. Paul Bevilaqua has spent much of his career developing Vertical Take Off and Landing aircraft. He joined Lockheed Martin as Chief Aeronautical Scientist and became Chief Engineer of the Skunk Works, where he played a leading role in creating the Joint Strike Fighter. He invented the dual cycle propulsion system that made it possible to build a stealthy supersonic VSTOL Strike Fighter, and suggested that conventional and Naval variants of this aircraft could be developed to create a common, affordable aircraft for all three services. He subsequently led the engineering team that demonstrated the feasibility of building this aircraft.

Prior to joining Lockheed Martin, he was Manager of Advanced Programs at Rockwell International's Navy aircraft plant, where he led the design of VSTOL interceptor and transport aircraft. He began his career as an Air Force officer at Wright Patterson AFB, where he developed a lift system for an Air Force VSTOL Search and Rescue Aircraft. He received degrees in Aeronautical Engineering from the University of Notre Dame and Purdue University.

He is a Fellow of the American Institute of Aeronautics and Astronautics and a member of the National Academy of Engineering. He is also the recipient of a USAF Scientific Achievement Award, AIAA and SAE Aircraft Design Awards, AIAA and AHS VSTOL Awards, and Lockheed Martin AeroStar and Nova Awards.

Abstract: "Inventing the Joint Strike Fighter"

The F-35 Joint Strike Fighter was developed to meet the multirole fighter requirements of the US Air Force, Navy, Marine Corps, and our allies. The Air Force variant is a supersonic, single engine stealth fighter. The Navy variant has a larger wing and more robust structure in order to operate from aircraft carriers, while the Marine Corps variant incorporates an innovative propulsion system that can be switched from a turbofan cycle to a turbo shaft cycle for vertical takeoff and landing. This propulsion system enabled the X-35 to become the first aircraft in history to fly at supersonic speeds, hover, and land vertically. The development team won the Collier Trophy, which recognizes "the greatest achievement in aeronautics or astronautics in America" each year, for this accomplishment. This presentation will describe the technical and program challenges involved in developing the Joint Strike Fighter and show how an innovative idea became an international program with engineers from half a dozen countries developing a single replacement aircraft for multiple aircraft types.

GEORGE BIBEL

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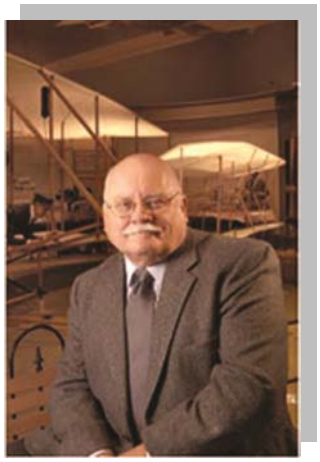
Biography:

George Bibel is a professor of mechanical engineering at the University of North Dakota where he teaches traditional engineering courses and an innovated new course based on engineering disasters. He has written *Beyond the Black Box: The Forensics of Airplane Crashes*. The book teaches high school science with unusual and interesting airplane accidents. Beyond the Black Box was also expanded into a training seminar presented at Boeing. The book was favorably reviewed by *New Scientist*, the *New York Times*, and *Discovery Magazine* and featured in the *RAF News*. Dr. Bibel has also written a related article appearing in the *New York Times*, “Listen Up and Fly Right.”

Abstract: “Beyond the Black Box: The Forensics of Airplane Crashes”

Beyond the Black Box shows how crash investigators use physics, aerodynamics, and mechanical engineering to determine the probable cause of a crash and how resulting safety recommendations are incorporated to make flying safer. Crash testing, explosive decompression, metal fatigue, fuel tank explosions, uncontained engine failures and human tolerance to inertial loads are major topics covered.



TOM CROUCH

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Biography:

Tom Crouch is Senior Curator of the Division of Aeronautics at the National Air and Space Museum (NASM). A Smithsonian employee since 1974, he has served both the NASM and the National Museum of American History (NMAH) in a variety of curatorial and administrative posts. Prior to joining the Smithsonian, he was employed by the Ohio Historical Society as Director Of Education (1969–1973) and as Director, Ohio American Revolution Bicentennial Advisory Commission (1973–1974).

Dr. Crouch holds a BA (1962) from Ohio University, an MA (1968) from Miami University, and a PhD (1976) from the Ohio State University. All of his degrees are in history. In addition, he holds the honorary degree of Doctor of Humane Letters, conferred in June 2001 by the Wright State University.

He is the author or editor of a number of books and many articles for both popular magazines and scholarly journals. Most of his work has been on aspects of the history of flight technology. Dr. Crouch's leading books include: *The Bishop's Boys: A Life of Wilbur and Orville Wright* (New York: W.W. Norton, 1989); *Eagle Aloft: Two Centuries of the Balloon in America* (Washington, DC: The Smithsonian Institution Press, 1983); *Bleriot XI: The Story of a Classic Airplane* (Washington, D.C.: Smithsonian Institution Press, 1982); *A Dream of Wings: Americans and the Airplane, 1875–1905* (New York: W.W. Norton, Inc., 1981); *The National Aeronautics and Space Administration* (New York: Chelsea House, 1987); *Apollo: Ten Years Since Tranquility Base* (Washington, D.: Smithsonian Institution Press, 1979); *Charles Lindbergh: An American Life* (Washington, DC: Smithsonian Institution Press, 1977); and *The Giant Leap: Ohio Aerospace Events and Personalities, 1815–1969* (Columbus, O: The Ohio Historical Society, 1971).

Dr. Crouch has won a number of major writing awards, including the history book prizes offered by both the American Institute of Aeronautics and Astronautics and the Aviation/Space Writers Association. He received a l989 Christopher Award, a literary prize recognizing "significant artistic achievement in support of the highest values of the human spirit" for *The Bishop's Boys: A Life of Wilbur and Orville Wright.* Dr. Crouch was awarded the Smithsonian Distinguished Lecturer Award for 2002.

Throughout his career, Dr. Crouch has played a major role in planning museum exhibitions. He was involved in planning exhibitions for the Neil Armstrong Museum, Wapakoneta, Ohio; the Ohio Historical Center, Columbus, Ohio; and both the National Air and Space Museum and the National Museum of American History. He takes particular pride in having served as the curator of "A More Perfect Union: Japanese Americans and the United States Constitution," which opened at the National Museum of American History in October 1987 and remains on view today.

In the fall of 2000, President Clinton appointed Dr. Crouch to the Chairmanship of the First Flight Centennial Federal Advisory Board, an organization created to advise the Centennial of Flight Commission on activities planned to commemorate the 100th anniversary of powered flight.

Dr. Crouch has been married to the former Nancy Anne Gochenouer for more than thirty years. They are the parents of three grown children.

Abstract: "Tracing the Course of AIAA Over 75 Years"

Offered to the members of the newly organized American Society of Mechanical Engineers was devoted to flight as an engineering problem. The American Rocket Society, one branch of the AIAA lineage, began with a group of science fiction writers and enthusiasts meeting in a New York speakeasy in the spring of 1930. The Institute of the Aeronautical Sciences, on the other hand, was organized in 1932 by those who sought to create an engineering elite. Crouch offers an entertaining stroll through seven and one half decades of organizational twists, turns and achievements. The emphasis is on the people who shaped the history of AIAA, and the American aerospace enterprise.

Abstract: “Why Wilbur and Orville?”

Dr. Tom D. Crouch, senior curator of aeronautics at the National Air and Space Museum, Smithsonian Institution, offers a lively, slide-illustrated talk entitled: “Why Wilbur and Orville?” He opens with a discussion of the Wright family, and identifies some of the characteristics and talents that set Wilbur and Orville apart from other experimenters. How did the famous brothers become interested in flight? How did they succeed where so many others had failed? What impact did their work have on Europe and America? Dr. Crouch, a biographer of the Wright brothers, answers these and many other questions as he retraces the steps of the inventors of the airplane as they move toward the triumph at Kitty Hawk and continue on to the development of a practical flying machine.

Abstract: “Mr. Lincoln’s Air Force”

On June 18, 1861, T.S.C. Lowe made a tethered balloon ascent to an altitude of 500 feet above a spot on the Smithsonian grounds directly in front of the present sire of the NASM. Lowe sent a telegram to the White House, and later met with the President. The flight was the first time a telegram had been sent from the air, represented the first step toward the creation of an observation Balloon Corps for the Union army, the first military aviation unit in American History, and marked the birth of aerial reconnaissance in the U.S..
In this richly illustrated talk, Dr. Tom Crouch will describe the life and work of T.S.C. Lowe and the role of reconnaissance balloons during the Civil War.

MICHAEL DRAKE

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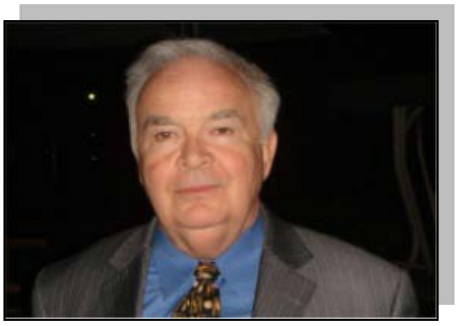
Biography

Michael Drake is a full Technical Fellow of Aircraft Configuration Design for The Boeing Company in Seattle, Washington. A graduate of the University of Texas at Arlington with a BS in Aerospace Engineering in 1984, Michael has worked for Boeing Commercial Airplanes ever since. Hired directly in as a Configuration Design engineer (a role akin to airplane architect), his range of experience has been about every aspect of Transport category configuration design, ranging from derivative development (757 Package Freighter, 757-300) to joint international aircraft development activities of small (100 seat) and large (600 seat) new aircraft. He was lead baseline Configuration Designer throughout Boeing's New Large Airplane and later 747-600X efforts of the 1990s. Later, as an Associate Technical Fellow, he oversaw Configuration Design of New Airplane Product replacement studies, including the Sonic Cruiser development. As a full Technical Fellow, Michael was at the very earliest beginnings of the development of what evolved into the 7E7, and then 787. He saw the 787 through to Firm Configuration of both the 787-8 and more recently, the 787-9 models. Michael is an AIAA Associate Fellow and is the current Chairman of AIAA's Technical Committee on Aircraft Design.

Abstract

"Technology and Innovation in the 787 Dreamliner"

The Boeing 787 is a breakthrough development in Commercial Aviation. In flight test today, with initial deliveries planned for later this year, the airplane is at the cutting edge of 21st century Aerospace technologies. This talk will introduce this remarkably efficient and capable airplane. Some perspective of the journey of its evolution will be covered. This will be followed by an overview of the key airplane elements and features, including touching on its advanced technologies such as composite primary airframe design (a first for large commercial transports) and paradigm-shifting advanced more electric airplane systems. The development of this airplane is a truly global endeavor, and the talk will touch on the scope of this vast design and production effort. Finally, the talk will summarize the airplane as it stands today, and how it is just at the beginning of its development life.



EUGENE L. FLEEMAN

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Biography:

Eugene L. Fleeman has 48 years of government, industry, academia, and consulting experience in the design and development of missile systems (web site http://genefleeman.home.mindspring.com/). Formerly a manager of missile programs at the Air Force Research Laboratory, Rockwell International, Boeing, and Georgia Tech, he is an international lecturer on missiles and the author of over 100 publications, including the American Institute of Aeronautics and Astronautics (AIAA) textbook *Missile Design and System Engineering*. He is an AIAA Associate Fellow and a former chair of the AIAA Missile Systems Technical Committee.

Abstract: "Missile Design and System Engineering"

This lecture presents the fundamentals of missile design, development, and system engineering. It addresses the broad range of alternatives in satisfying missile cost, performance, risk, and launch platform integration requirements. The methods presented are generally simple closed-form analytical expressions that are physics-based, to provide insight into the primary driving parameters. Typical values of missile parameters and the characteristics of current operational missiles are discussed, as well as the enabling subsystems and technologies for missiles and the current/projected state-of-the-art. Videos are presented to illustrate missile development activities and performance.

RICHARD GRAHAM

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Biography:

Colonel (ret) Richard Graham graduated from the University of Akron, Akron, Ohio in 1964. He received a master's degree in Sociology in 1977 and in Public Administration in 1979 from Pepperdine University, Los Angeles, California. He received his Air Force wings in 1965 at Craig AFB in Alabama. He remained at Craig as a T-37 Instructor Pilot and Flight Examiner until 1970. Upon completion of F-4 Phantom fighter training, he flew 210 combat missions over North Vietnam and Laos from 1971-1972 and as a Wild Weasel pilot from 1972-1973.

He was selected to enter the SR-71 strategic reconnaissance program in 1974 at Beale AFB, California. He flew the SR-71 for the next seven years, amassing 756 hours in the world's fastest and highest-flying aircraft. In 1980, he was selected to be the squadron commander of the SR-71 unit at Beale, where he served until his assignment to the Air War College at Maxwell AFB, Montgomery, Alabama.

In June of 1982, he was assigned to the Pentagon to work in Programs and Resources as a strategic force programmer. In 1984 he was promoted to colonel and selected to work in the Office of the Assistant Secretary of the Air Force, working closely on budgetary matters with the Office of the Secretary of Defense, the Joint Chiefs of Staff, and the Air Staff.

In 1986, Colonel Graham was the Vice Wing Commander at Beale AFB. In June of 1987 he was selected to be the 9th Wing Commander. During that time he was privileged to be able to fly the SR-71, U-2, T-38 and KC-135Q concurrently, for over two years. During his 25 years of service he amassed 4,600 hours, retiring from the Air Force in 1989. His military decorations include three Legion of Merit awards, four Distinguished Flying Cross medals and 19 Air Medals.

Upon retirement from the Air Force, he joined American Airlines in Dallas, Texas. After flying 13 years at American, he retired in August 2002 as a Captain on the MD-80 aircraft, with over 7,500 hours. Col. Graham is currently a check pilot with the Civil Air Patrol and volunteers as a FAA representative on their safety team in Dallas. He and his wife, Pat, live in Plano, Texas. They have five children and four grandchildren.

He has written three books, *"SR-71 Revealed,"* "*SR-71 Blackbird: Stories, Tales, and Legends,"* and *"Flying the SR-71 Blackbird."* Colonel Graham was the 1999 recipient of the University of Nebraska's William F. Shea Award for his distinguished contribution to aviation. In 2005, the Blackbird Association awarded him the Kelly Johnson trophy, a lifetime achievement award for his work to perpetuate, foster and improve the SR-71.

Abstract: "SR-71 Blackbird – An Engineering Marvel"

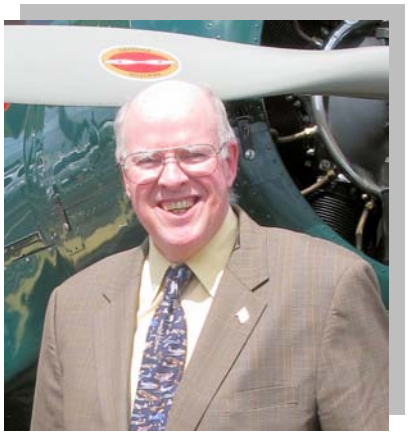
The world's fastest and highest flying aircraft was conceived as early as 1958 by the renowned aircraft engineer, Kelly Johnson. The gigantic leap in technology he and his engineers had to overcome at the Lockheed Skunk Works was phenomenal. Built in total secrecy, the first Blackbird flew on April 26, 1962. The Blackbird's only purpose was to gather highly classified intelligence on hostile countries around the world. Flying at Mach 3+ speeds and cruising at over 85,000 feet, the SR-71 could survey over 100,000 square miles every hour, gathering millions of bits of intelligence. When cruising at over 2,100 mph, with skin friction temperatures reaching 600 degrees F., the SR-71 performed at its very best.

From 1967 to 1990, the SR-71 served seven U.S. Presidents, the Central Intelligence Agency (CIA), the National Security Agency (NSA), the Defense Intelligence Agency (DIA), the Pentagon and other government agencies. It provided them with the necessary intelligence to make crucial political and military decisions during the Cold War era.

This presentation can be tailored to the audience and includes an entertaining presentation and two short, narrated videos...one on the SR-71, and another honoring the legendary Lockheed "Skunk Works" aircraft

engineer, Kelly Johnson. This presentation links the world of engineering with aviation and gives the audience a much deeper appreciation of just how far “outside the box” Kelly Johnson had to think.

The Q&A session at the end of this program gives the audience an opportunity to ask questions about the once highly classified program.



RICHARD P. HALLION

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Dr. Hallion received a BA in 1970 and a Ph.D in 1975, both from University of Maryland. He also graduated from the National Security Studies Program for Senior Executives, Kennedy School of Government, Harvard University, 1993.

He was the Curator of Science and Technology, National Air and Space Museum, 1974-1980; the NASA Contract Historian, and Adjunct Faculty at the University of Maryland, 1980-1982; the Air Force Historian at Edwards AFB, Wright-Patterson AFB, Andrews AFB, and the Pentagon, 1982-2004; the Senior Advisor for Air and Space Issues, Office of the Secretary of the Air Force 2004-2006; the Special Advisor for Aerospace Technology to the Air Force Chief Scientist, 2006-2008; the Senior Advisor, Commonwealth Research Institute/Concurrent Technologies Corporation, 2007-present; the Vice President, Earth Shine Institute, 2009-present; and a Research Associate in Aeronautics, National Air and Space Museum, Smithsonian Institution, 2010-present.

Dr. Hallion is the author of: 13 books; 12 monographs and special studies; 31 chapters; numerous articles, essays, and presentations; and the editor of 6 books.

He is a Fellow,of AIAA, RAes, and the Royal Historical Society; and a member of the Air Force Association; the Association of Naval Aviation; the United States Naval Institute; the International Test and Evaluation Association, the National Defense Industrial Association; the Royal United Services Institute for Defence Studies; the American Aviation Historical Society; and the Society for the History of Technology.

Abstracts

"The High-Speed Revolution: How Aviation Progressed From the Subsonic to the Hypersonic Era." Traces the evolution of aerospace technology from the high-performance subsonic propeller-driven monoplane through the invention of the jet engine, the aerodynamic and propulsion challenges of transonic flight, the role of flight testing and flight research, and the international progression of aviation into the supersonic and hypersonic era, drawing on case studies of various international programs and presenting lessons learned from this history.

"A Century of Military Aviation." The airplane, like the submarine, introduced three-dimensionality to warfare, dramatically transforming the nature of combat across the spectrum of conflict from low-intensity to high-intensity war. This talk examines the key aspects of military air power evolution, its impact upon strategy and combat operations, and the implications of contemporary developments in military aerospace capabilities to the future of conflict.

"Naval Aviation: The First Hundred Years." 1911 marked the 100th anniversary of naval aviation. This talk examines how the Navy adapted to the airplane, how aircraft influenced the naval campaigns of the First and Second World Wars, and how naval aviation functioned throughout the Cold War and post-Cold War era. Specific technical developments of both ships and aircraft are evaluated and their impact upon combat operations is presented. Lessons learned from the first century of naval aviation are enumerated, and its current status is examined.

"Global Aviation in the Interwar Era." The years between the First and Second World War constitute what is commonly called the "Golden Age" of aviation, but they were, as well, a time when dramatic changes took place in the international balance of air power, aviation development, and the employment of aviation for civil and military purposes. This talk traces the development of aviation over that time period, the role of governmental and private support for aeronautical research and development, and the growth of commercial aviation and military air power.

"Air Power in the First World War." 2014 marks the 100th anniversary of the "War to End All Wars," which marked the first mass use of aircraft and airships in air warfare. Often seen as irrelevant to the war's larger outcome, air power in the "Great War" actually had a surprisingly influential effect on both land and maritime operations. The roles and missions of modern air power were first enunciated and promulgated in the First World War, as were basic concepts of doctrine and command and control. This talk examines how air power evolved from the time of the first military aircraft in 1908 through the Armistice in 1918, and the implications of that experience to what happened afterwards—and today and the future as well.

"Air Power in the Second World War." The Second World War marked the maturation of air power and three-dimensional attack from both the air and from beneath the sea. From the *Blitzkrieg* in 1939 through the dropping of the Atomic Bomb in 1945, air power played a central role in the strategy and conduct of combat operations. This talk examines the global air war, the key events that shaped the war's outcome, and the impact of aeronautical and propulsion technology, and the respective national industries, upon the shaping and employment of military air forces.

"The History of Hypersonics." The advent of supersonic flight opened the path to the hypersonic frontier, first crossed by rockets and missiles and then by uninhabited and piloted winged vehicles and spacecraft. This talk examines how hypersonic flight evolved from a dream of the great pioneers of astronautics to a practical field of technical inquiry. Key programs and technical developments in aerodynamics, structures, propulsion, and controls are examined, together with lessons learned, and an assessment of the current state and future prospects of this exciting field.

"Air Dominance: The Enduring Requirement." Since the advent of the military airplane, seizing and controlling the air has been of crucial importance. With control of the air, all other missions are possible; without control of the air, all other missions are compromised and endangered. This talk examines the evolution of air dominance warfare, including the history of fighter aircraft development, defensive and offensive fighter strategy and tactics, the evolution of ground-based air defense threats (particularly surface-to-air missiles), and examines the current challenge of waging effective air operations in the emerging era of 5th Generation and Double-Digit SAMs. Combat experience and lessons learned are presented from a variety of conflicts and crises in which air dominance proved of crucial importance, or crucially lacking.

PAUL J. KOSTEK

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Paul J. Kostek is a Principal of Air Direct Solutions, a systems engineering/ project management consulting firm. He works with companies in defining system architecture and design, system requirements, and software development standards. Paul received his BSEET from the University of Massachusetts, Dartmouth.

Paul was the Chair of the AIAA Career Enhancement Committee from January 2007 through May 2008 and a member of the committee beginning in 1995. He started the AIAA Career Workshop held annually (since 1997) at the Aerospace Sciences meeting and is a distinguished lecturer on career issues.

Paul was the Chair of the IEEE-USA Career and Workforce Policy Committee. In 1999 Paul was the President of IEEE-USA, and a member of the IEEE Board of Directors. He has also served as President of the IEEE Aerospace & Electronics Systems Society in 2000–2001 and was a director of the Washington Aerospace Alliance (PNAA.net). In 2003 he was the Chairman of the American Association of Engineering Societies. He Chaired the Pacific Northwest Section of AIAA in 2006. Paul was the Chair of the 2011 & 12 IEEE Global Humanitarian Technology Conference, Chaired the 2006 IEEE/AIAA Digital Avionics Systems Conference and was the General Chair of the 2004 IEEE Intelligent Transportation Systems Conference.

He is the past Chair of the IEEE Career Maintenance and Development Committee, a past Board member of the Puget Sound Career Development Association (PSCDA) and an active volunteer for PSCDA providing career counseling throughout the year. Paul has written on career issues for such publications as: *Today's Engineer, Dr. Dobbs*, *Puget Sound Business Journal*, and *Wireless System Design*. And is the author of the IEEE-USA e-Book, *Personal Positioning for Engineers*.

Paul is an Associate Fellow of the American Institute of Aeronautics and Astronautics, a Senior Member of the IEEE, a member of the International Council on Systems Engineering, SAE, and the Project Management Institute.

Abstract: "Personal Positioning for Engineers"

In the 21st Century the employment options we have will be expanding and changing. What we do today may not be what we do tomorrow. Success will be determined by our ability to position ourselves to take advantage of opportunity. But not all of the options will work for each person. In this presentation we will look at several employment and career options. Along with discussing the different employment options (direct/contract/self-employment) each participant will be asked to consider a series of questions on each of these options. We will also look at the following career options: large company versus small company, and management track versus technical track.

ROGER D. LAUNIUS

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Biography:

Roger D. Launius is senior curator in the Division of Space History at the Smithsonian Institution's National Air and Space Museum in Washington, D.C., where he was division chair 2003-2007. Between 1990 and 2002 he served as chief historian of the National Aeronautics and Space Administration. A graduate of Graceland College in Lamoni, Iowa, he received his Ph.D. from Louisiana State University, Baton Rouge, in 1982. He has written or edited more than twenty books on aerospace history, including *Smithsonian Atlas of Space Exploration* (HarperCollins, 2009); *Robots in Space: Technology, Evolution, and Interplanetary Travel* (Johns Hopkins University Press, 2008); *Societal Impact of Spaceflight* (NASA SP-2007-4801, 2007); *Critical Issues in the History of Spaceflight* (NASA SP-2006-4702, 2006); *Space Stations: Base Camps to the Stars* (Smithsonian Books, 2003), which received the AIAA's history manuscript prize; *Reconsidering a Century of Flight* (University of North Carolina Press, 2003); *To Reach the High Frontier: A History of U.S. Launch Vehicles* (University Press of Kentucky, 2002); *Imagining Space: Achievements, Possibilities, Projections, 1950-2050* (Chronicle Books, 2001); *Reconsidering Sputnik: Forty Years Since the Soviet Satellite* (Harwood Academic, 2000); *Innovation and the Development of Flight* (Texas A&M University Press, 1999); *Frontiers of Space Exploration* (Greenwood Press, 1998, rev. ed. 2004); *Spaceflight and the Myth of Presidential Leadership* (University of Illinois Press, 1997); and *NASA: A History of the U.S. Civil Space Program* (Krieger Publishing Co., 1994, rev. ed. 2001). He served as a consultant to the *Columbia* Accident Investigation Board in 2003 and presented the prestigious Harmon Memorial Lecture on the history of national security space policy at the United States Air Force Academy in 2006. He is frequently consulted by the electronic and print media for his views on space issues, and has been a guest commentator on National Public Radio and all the major television network news programs.

Abstract: "Why Go to the Moon: The Many Faces of Lunar Policy"

What is it about the Moon that captures the fancy of humankind? A silvery disk hanging in the night sky, it conjures up images of romance and magic. It has been counted upon to foreshadow important events, both of good and ill, and its phases for eons served humanity as its most accurate measure of time. This presentation discusses the Moon as a target for Human exploration and eventual settlement. It explores the more than 50-year efforts to reach the Moon, succeeding with space probes and humans in Project Apollo in the 1960s and early 1970s. It will then discuss efforts to make the Moon a second home, including post-Apollo planning, the Space Exploration Initiative, and problems and opportunities in the 2004 Vision for Space Exploration.

Abstract: "Envisioning the Earth: Conceptions of this Planet from the Flat Earth to Gaia"

Astronaut Joseph Allen recently made the observation that exploring the Moon in the 1960s was never really about going to the Moon. "With all the arguments, pro and con, for going to the Moon," he commented, "no one suggested that we should do it to look at the Earth. But that may in fact be the one important reason." This observation serves as the entrée point for this presentation exploring the manner in which Western Civilization has conceived of the Earth as an entity and as a home. It will begin with ancient ideas about the Earth as a sphere or as a flat body and trace this theme to the present, as well as the themes of hollow Earth, Spaceship Earth, and Gaia. It will also explore the manner in which scientists came to understand the size and shape of the Earth and its geodesy. It also offers a discussion of the nature of Earth maps and their evolution over time, with all of the attendant issues associated with them, privileging Europe and North America over other regions, etc. Finally, it pursues the place of imagery from space and its contribution to the public understanding of how Western Civilization envisions this planet and its place in the universe.

Abstract: "Whither the Space Shuttle?"

This presentation reviews the history and legacy of the Space Shuttle program after thirty years. It suggests that while the shuttle was not an unadulterated success on balance it served a venerable role in spaceflight and deserves an overall positive assessment in history. We find that while the Space Shuttle has a reputation as a mistake it was generally successful. Additionally, the Space Shuttle provided three decades of significant

human spaceflight capability and stretched the nature of what could be accomplished in Earth orbit much beyond anything envisioned previously. Most significantly since the American human spaceflight program has always been focused in national prestige, the Space Shuttle served well as a symbol of American technological verisimilitude. Finally, this presentation discusses the retirement of the Space Shuttle and possibilities for the future of human spaceflight.

Abstract: "Denying the Moon Landings: Why Does it Look like the Flag is Blowing in the Wind?"

Almost from the point of the first Apollo missions, a small group of Americans denied that it had taken place at all. They argued that the missions had been faked in Hollywood by the federal government for purposes ranging from embezzlement of the public treasury to complex conspiracy theories involving international intrigue and murderous criminality. Why, they wondered, was the flag flying in the photos from the Moon when there is no wind? They tapped into a rich vein of distrust of government. At the time of the first landings, opinion polls showed that overall less than five percent, among some communities larger percentages, "doubted the moon voyage had taken place." Fueled by conspiracy theorists of all stripes, this number has grown over time. How, and most importantly, why has this questioning of the Moon landings taken place? What does it say about our culture? How might we discern the truth? Find out why it looks like the flag is blowing in the wind.

Abstract: "Are We Alone in the Universe"

This is the most important question in all of space science. Virtually everyone believes there is life beyond Earth, but where is it? We have been seeking life with planetary probes and firmly believed we would find it on Mars. Thus far, there is no evidence. This presentation explores the new discipline of astrobiology and raises questions about the nature of life. Lynn Margulis, the MIT biologist, asked the question several years ago, "If we encountered life beyond Earth would we even recognize it as such?" That question will be considered in this presentation. During the 1990s scientists grew to appreciate how incredibly robust microbial life can be, found in the superheated water of deep-sea vents, pools of acid, or even within the crust of the Earth itself. The chance of finding such simple life on other bodies in our solar system has never seemed more realistic. But, what about complex, even technologically sophisticated, life? We have been engaged in the "Search for Extraterrestrial Intelligence" (SETI) formally since 1960, but have yet to discover a radio signal amongst the static of the cosmic background. The discovery of more than 350 extra-solar planets excites prospects that there may be an Earthlike planet yet to be discovered where life as we understand it might exist. Then there is the issue of UFOs and the belief by many that we are being visited by intelligence from beyond Earth. These themes will all be discussed in this engaging presentation.

Abstract: "Space: Journeying Toward the Future"

In the more than fifty years since the beginning of the space age in 1957, much has been accomplished, our knowledge advanced, and a future made more positive. This presentation offers a survey of spaceflight history and offers comments on what might be expected in the next fifty years.

Abstract: "After Apollo: The Legacy of the Moon Landings"

For the last several years I have been working on a book project that is now nearing publication. It deals with the legacy of the Moon landings of the latter 1960s and the early 1970s and poses questions about the manner in which it has been understood over time. I would like to preview this study in this short presentation. The major contours of the American sprint to the Moon during the 1960s have been told and retold. Project Apollo—the sites where it took place, the people who participated in it, and the memory of it—have been singled out for comment, celebration, or castigation, depending on one's perspective. This begs several questions. What has been the significance of this activity after some forty years? How do those who recall the effort understand it at the beginning of the twenty-first century, a postmodern world far removed from that of the late 1960s and early 1970s? What do the Moon landings mean to people of differing cultural, generational, economic, and ethnic backgrounds? What role did Apollo play at the time—and after—in helping to define modern American society, politics, and self-perception? What is it about the Apollo program of the 1960s and early 1970s that captured the imagination—that is, if it did—of the American people? Finally, what about Apollo retains its saliency nearly forty years after the last Moon landing in December 1972? I look forward to your feedback.

Abstract: “Transcendence and Meaning in the First 50 Years of Solar System Exploration”

The exploration of the solar system profoundly changed both how our civilization views the rest of the universe and how it also views itself from new perspectives gained as a result of space exploration. In the first fifty years of the space age, knowledge has been revolutionized about the solar system through a combination of space and ground based observatories, probes to other planets, and other methods of analysis. The best quote I have seen relating to the accomplishments of space science during the space age came from the late Merton Davies: “The joy of exploration is finding answers for which there are no questions.” Learning the answers to questions initially not perceived and then expanding on the effort in the exploration of the solar system offers an opportunity to reevaluate our natural setting. There have been many issues and questions worthy of consideration that will be touched upon in this essay:

(1) What have been the big questions of planetary science and what has been learned in the more than fifty years of the space age?
(2) What has been the evolution of the manner in which scientific knowledge about the solar system has been acquired, refined, analyzed, and disseminated over time?
(3) What is the relationship of the various flight projects to the broader implications for the exploration of other solar system bodies?
(4) What has been the development of space science disciplines and institution building in relation to NASA's mission?
(5) How might we interpret the uneasy alliance between robotic exploration and human spaceflight?
(6) How has the public communication of scientific knowledge across broad constituencies been accomplished over the space age?

GREG MEHOLIC

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Biography:

Mr. Meholic currently works as a project engineer for The Aerospace Corporation supporting space launch vehicle concept development and advanced propulsion system studies for the U.S. Government. Prior to his current position, he supportedupper-stage cryogenic rocket engine launch activities, performance reviews, and hardware design assessments for most of the U.S. space launch systems, contributing to over three-dozen successful missions. His work also included defining launch vehicle operational requirements, launch systems and designs, and leading numerous project teams for NASA-funded studies regarding the capabilities and testing of advanced engines.

Greg graduated in 1995, earning both his bachelors and masters degrees in aerospace engineering from Embry-Riddle Aeronautical University. His first professional position was at General Electric Aircraft Engines where he worked in gas turbine performance and preliminary design, component life analysis, mechanical design, and advanced concept development. His work on the pulse detonation engine (PDE) program there allowed him to develop four patents on PDE valve concepts and applications. He also gained extensive experience with engine servicing, component production and testing. While at GEAE, Greg also began teaching within the company and eventually developed several classes for new employees on product familiarization. That interest has continued and he now is a part-time lecturer at both the University of California at Los Angeles and Loyola-Marymount University, regularly instructing courses on aircraft and spacecraft propulsion.

Although Greg focused his graduate studies on propulsion systems and aerodynamics, he has always been fascinated by the possibility of faster-than-light (FTL) space travel. Ever since his early college days, he has developed many theories of his own that have evolved into a unique model of the space-time and the universe bordering on a grand unified theory. Out of these ideas came a new proposal for the definition of gravity and inertia, possible applications of string theory, a suggested source of dark matter and the Trans-Space method of FTL travel, which is different from the traditional “warp drive” that has garnered public familiarity and science-fiction fame. Since 1998, he has published several papers on his work and has delivered many award-winning presentations on his ideas at technical conferences.

Greg is a Senior Member in AIAA and has been a member of the AIAA Nuclear and Future Flight Propulsion Technical Committee for over ten years. He is the session organizer for that committee for the AIAA-sponsored Joint Propulsion Conferences and also chairs related sessions at other technical venues. He has been interviewed on several internet-based technology shows as well as by the famed physicist Dr. Michio Kaku on advanced space propulsion concepts.

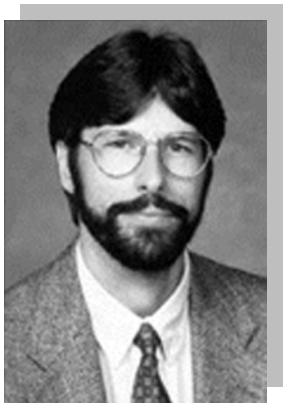
Greg is an instrument-rated private pilot and has flown all over the country in his Cessna 172. He and his wife are extremely active with their toddler son and can be found roller-blading, bicycling or hiking in the Los Angeles area.

Abstract: “Advanced Space Propulsion Concepts for Interstellar Travel”

The presentation begins by examining just a few of the compelling reasons why humans should explore the heavens beyond the bounds of the solar system. Certain terms and issues are defined to clarify the requirements of such daunting journeys. The talk then centers around the key technology required to make such missions possible—propulsion. To start with, a brief discussion is given on the current state of the art of in-space chemical propulsion systems to develop a foundation of “where we are today” with respect to engine technology. The talk then takes a more “evolutionary” approach by exploring some of the more advanced

engine systems intended for long-range solar system exploration, such as nuclear engines, antimatter engines and interstellar ramjets, which will define the physical limits of chemical propulsion capability.

After comparing the predicted performance of these advanced concepts to the requirements for interstellar journeys, the focus of the talk will then shift to a describe a new paradigm of “propellantless” propulsion schemes that have their basis in modern theoretical physics and cosmology. If found attainable, concepts such as space-time manipulation, faster-than-light travel, wormholes, quantum drives, and so on, may provide the only viable avenue for candidate systems if trip times to distant stars are to last a reasonable fraction of a human lifetime. To show that these ideas are not merely the dreams of science-fiction, brief descriptions will be given on the latest, global, experimental efforts to explore the fundamental forces behind some of these intriguing concepts. The talk will end with some inspiring conclusions and hopefully instill the belief that mankind will someday move beyond the bounds of our solar neighborhood.



L. SCOTT MILLER

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Biography:

Dr. L. Scott Miller is a Professor and Chair of Aerospace Engineering and a National Institute for Aviation Research Fellow at Wichita State University (WSU). Scott received his Ph.D., in aerospace engineering, from Texas A&M University in 1988 and began working at WSU the same year. He has been involved in various research projects and, in addition, worked summers at Boeing and NASA Langley Research Center. Active in AIAA, Scott currently serves as the WSU Student Section faculty advisor and the Student Activities Committee Chairman. He has been honored as a Bombardier–Learjet Fellow (1995–98), a Dow Outstanding Young Faculty Award recipient (1994), the AIAA National Faculty Advisor Award recipient (2002), and an AIAA Outstanding Section Chairman (1999). Professional interests include education, experimental aerodynamics, airfoil & aircraft design, rotor aerodynamics, wind energy, and laser velocimetry. In addition, he is a “certified airplane nut.”

Abstract: “Shadow Craft – A World of Secret Flight”

A great deal of aircraft development in America has taken place in secrecy. The U-2, SR-71 Blackbird, B-2 Spirit Bomber, and F-117 Stealth Fighter are some now high-profile examples of once hidden efforts. If you believe the recent and rampant rumors, there are more secret aircraft currently hiding in the shadows.

The existence of these rumors, at minimum, provokes the public interest and generates lots of questions. For example, what goes on in “Area 51” and what specifically has happened or might now be happening in the secret or “black” world? What new technologies and missions are associated with the rumored planes, where are they built and based, and how many are operational? Is it actually possible to build a visually stealth airplane? Are some of the aircraft unmanned? Does the hypersonic vehicle popularly called “Aurora” really exist? There are obviously many questions, with elusive and interesting answers.

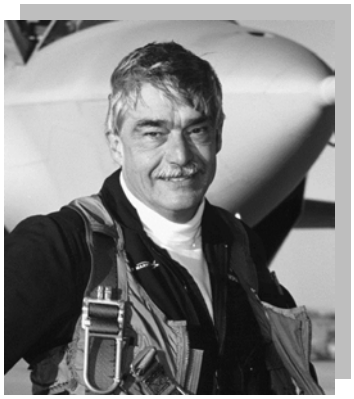
The presentation will summarize many of the rumors and review publicly available evidence that suggests the existence of secret aircraft projects. The viability of the rumors and evidence will be discussed and some additional ideas will be offered.

Everyone loves a mystery. Who knows what craft lurks in the shadows, hinting at an exciting world of flight?

Abstract: “Evolutionary Mishaps or Interesting Aircraft?”

Aviation is generally recognized as successfully and rapidly evolving since the Wright brothers’ first flight. Although great advances have taken place in the past 100 or so years, it can be argued that the evolution has not been perfect or fault free.

A number of aircraft designs have obviously taken wrong or, at minimum, entertaining turns along the way. Such flying vehicles have attributes that could be described as simply odd, misguided, or intriguing. Whatever their status, they are significant within aviation’s history. Indeed, given required technology advancements or history’s tendency to repeat, it is possible they could come back again. This presentation will review some aircraft designs from the last 75 years that are potentially evolutionary mishaps or interesting ideas. You can decide for yourself.



THOMAS A. MORGENFELD

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Biography:

Thomas A. Morgenfeld, a 1965 graduate of the United States Naval Academy, was designated a Naval Aviator in 1967. He had two fleet tours flying the F-8 Crusader where he flew 90 combat missions and amassed over 500 carrier landings. Between those tours he attended the United States Naval Postgraduate School where he earned his MS degree in aeronautical engineering. In 1975 he attended the Empire Test Pilots' School in England, winning the McKenna Trophy as top student in his class. In 1976 Tom was ordered to Air Test and Evaluation Squadron FOUR where he participated in several classified test programs in addition to serving as the F-18 Project Pilot. In 1979 Tom went onto USAF exchange duty with the 4477th Test and Evaluation Flight where he was responsible for all USN involvement with the then top secret flying of MiG airplanes for exploitation purposes. At the end of that tour, he left active duty but went on to complete a 26-year naval career. His final billet was as commander of the Naval Weapons Center, China Lake reserve unit.

Tom joined Lockheed's Skunk Works in December 1979. He was first assigned to the F-117 program and went on to fly almost 1300 hours in developing that aircraft. In 1989 he went to the Advanced Tactical Fighter program where he was primarily responsible for flying the second YF-22A prototype. After Lockheed won that competition, Tom was named Chief Test Pilot for the YF-22A follow-on test program. In 1991 he was named Chief Test Pilot for the Skunk Works and in 1999 was promoted to Director of Flight Operations as well. Tom was the Chief Test Pilot on the Joint Strike Fighter program where he performed the first flight on the X-35 and tested all three versions of the airplane. He served as an Engineering Technical Fellow of the Lockheed Martin Aeronautics Co. until his retirement in 2004. Tom then worked over three years as a Test Pilot Instructor at the National Test Pilot School and is now on the Board of Trustees at that school. Over the years he has accumulated over 7,000 hours in more than 80 different aircraft.

A retired Navy Captain, Mr. Morgenfeld is a Fellow and past President of the Society of Experimental Test Pilots. He has received SETP's Iven C. Kincheloe Award for excellence in flight testing, is a member of two Collier Trophy winning teams, and has been inducted into the Aerospace Walk of Honor. A native of Hamburg, NY, he is married to the former Norma K. Shoemaker, also of Hamburg. They have two sons, CDR Steven A. Morgenfeld USN, a Naval Aviator, and Mr. Michael F. Morgenfeld, the Director of Cartography for Perseus Publications.

Abstract: "X-35 Test Pilot"

Mr. Morgenfeld was the Chief Test Pilot on the X-35 airplane from the start of the Joint Strike Fighter program through its final flight and contract award. During the course of the JSF program Mr. Morgenfeld tested all three versions of the airplane. He will recap the development of the X-35 prototype airplanes and will share many of his X-35 test experiences in this presentation. Mr. Morgenfeld is an excellent, enthusiastic, and enjoyable speaker.

Abstract: "Dancing With the (Lockheed) Stars"

This presentation is a light-hearted recap of Mr. Morgenfeld's lifelong fascination with and admiration for Lockheed airplanes. The presentation parallels the evolution of Lockheed airplanes with the development of his career as a Lockheed test pilot. It is non-technical and is filled with many personal memories of his flight test experiences.

THOMAS RAMSAY

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Biography:

Mr. Tom Ramsay is currently a senior engineer at Honda R&D Americas in the Vehicle Research Division, where he is the Leader of the newly formed Computational Methods Group, which conducts computational fluid dynamics (or CFD) for most passenger cars and light trucks developed for the North American market. Before working at Honda R&D, Tom worked at Battelle Memorial Institute in the National Security Division where he did anti-armor research, munitions design and development, and counter-explosive and counter-narcotic research.

Tom received a Bachelor of Science and Masters of Science in Aeronautical Engineering, both from The Ohio State University in 1989 and 1993, respectively. Tom is active in AIAA, having recently been the Chair of the Columbus Section as well as a member of the Fluid Dynamics Technical Committee and is currently the Membership Officer of the Columbus Section. Tom is also a member of SAE and belongs to the Vehicle Aerodynamics Forum Committee, the Vehicle Configuration Committee, and the Motorsports Engineering Conference Committee.

Tom's professional and vocational interests lie in the areas of aerodynamics, fluid dynamics, physics, and mathematics and include wide ranging topics such as automotive aerodynamics, applied computational geometry, the physics and mathematics of sports, numerical and experimental correlation, and race car aerodynamics, which is a nice fusion of his passion, education, and employment.

Abstract: "Race Car Aerodynamics"

In the past 30 years, car racing—from stock cars to open wheel, from solar powered to dragsters—has seen an explosion in technology and a subsequent dramatic increase in performance. Along with the advances in engine, suspension, and safety technologies, the impact of aerodynamics on performance has been especially important as speeds have increased. Due to the engine and chassis rules imposed by various sanctioning bodies, aerodynamics has increasingly been seen as an ever more important area to understand and exploit. The lecture will outline three aspects of racing: the car, the track, and the race, focusing mostly on open wheel race cars, where aerodynamics play a dominant role in reducing lap times.

Abstract: "Automotive Aerodynamics"

With the increased importance in fuel economy of road vehicles, whether from the recent change in mileage rating method (the official EPA calculated city/highway MPG), the mandated increase in automotive fuel economy, or the increase in fuel prices, the interest in automotive aerodynamics has subsequently increased. Because automobiles interact with air in many different ways, there is much more to automotive aerodynamics than just drag reduction. The lecture will briefly outline all the various aspects of automotive aerodynamics, from HVAC performance to wind noise to high speed stability, with an emphasis on the general issues and trade-offs of design decisions that affect an automobile's drag, as well as how drag fits into the overall scheme of fuel economy.

KENNETH J. SZALAI

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Biography:

Kenneth J. Szalai is a technical and management consultant in the U.S. and Europe in the areas of aeronautics and space. Prior to his consulting business, Szalai served as President of IBP Aerospace Group, Inc. He was the Director of the NASA Dryden Flight Research Center, Edwards, CA from 1990–98. Szalai joined the NASA Dryden Flight Research Center in 1964. He had previously held the positions of Director of Engineering and Chief of the Dynamics and Control Division at the NASA Dryden Flight Research Center.

He has served in various technical and management positions on dozens of experimental flight research programs, X-airplanes, and international programs, including the joint U.S.-Russian Tu-144 high-speed flight research program. Szalai is a specialist in flight controls and integrated systems, and was the Chief Engineer on the F-8DFBW program, the first digital fly-by-wire aircraft.

Szalai has authored over 25 papers and reports and has been a lecturer for the NATO Advisory Group for Aeronautical Research and Development. He has served on various technical committees and sub-committees for AIAA and SAE. Szalai graduated from the University of Wisconsin with a B.S. degree in electrical engineering and received a M.S. in Mechanical Engineering (Aeronautics) from the USC in 1971. He has received NASA's Exceptional Service Medal, Outstanding Leadership Medal, Distinguished Service Medal, and both the Meritorious and Distinguished Presidential Rank Awards. He is a fellow of the American Institute of Aeronautics and Astronautics and was awarded the AIAA 2000 Wright Brothers Lectureship. In 2003, he was a recipient of the ICAS Von Kármán Award for International Cooperation for his work on the X-31 U.S.-German experimental aircraft program.

Abstract: "Flights of Discovery – Experimental Flight Research in the Modern Era"

High-risk experimental flight research programs of the modern era are portrayed in words and pictures along with the discoveries that sprang from "expanding the envelope." The risks taken in these programs provided a foundation for advanced aircraft and new capabilities. The lessons learned from flight exploration at the frontiers of knowledge are also reviewed. Video clips of flights at and beyond controllable boundaries of the F-8 Digital Fly-by-Wire, F-18 High Angle of Attack, and X-31 Highly Maneuverable Aircraft provide unique insight into the world of experimental flight research.

JAMES D. WALKER

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Biography:

Dr. James D. Walker is an Institute Scientist at Southwest Research Institute in San Antonio, Texas, where he has worked for 23 years. SwRI is a non-profit engineering research center, employing over 3000 people on a 1100 acre campus. He was educated at the University of Utah and his primary field today is impact physics. He has won best paper, best poster, and best presentation awards. As part of the space shuttle *Columbia* accident investigation, he authored the chapter "Impact Modeling" in the *Report of the Columbia Accident Investigation Board* (Vol. 2, Appendix D.12). For his work in the investigation, he was awarded the ASME 2005 Holley Medal, given in "recognition of a great or unique act of an engineering nature, which accomplishes a great and timely public benefit." In 2004 he was included in *Popular Science*'s third annual "Brilliant 10" list. Dr. Walker is active in AIAA: he served as chairman of the Southwest Texas Section (1993-94), as chairman of the Weapon System Effectiveness Technical Committee (2000-02), and is currently the Region IV Director (2006-present). His other activities include church, soccer, scouting, high school robotics competitions, and politics (he was a member of the Electoral College in 2000). He is married to the former Debra Geddes; they have two children.

Abstract: "Mitigating Potentially Hazardous Near-Earth Objects"

Near-Earth objects (NEOs) are asteroids or comets that pass within 1.3 astronomical units (AU) of the Sun, and potentially hazardous objects (PHOs) are those that pass within 0.05 AU (roughly 9 times the distance to the Moon) of Earth's orbit and have an absolute magnitude of 22.0, corresponding to 150 meters across or greater. With the current sky survey program, about 3 new NEOs are discovered each night: as of August 2011, there were 8190 known NEOs (828 with a diameter greater than 1 km) and 1243 PHOs (150 with 1 km or greater diameter). (See neo.jpl.nasa.gov.)

This talk discusses what we know about NEOs and PHOs. There have been landings on two asteroids (Eros and Itokawa). We discuss proposed interior structures for asteroids and comets. We review what was learned by the Deep Impact spacecraft strike of comet Tempel 1 at 10.2 km/s (22,750 miles per hour) on July 4, 2005 and in the first (and so far only) successful prediction of an NEO striking Earth before it occurred: 2008 TC3 on October 7, 2008. Both impulsive (hypervelocity impacts and explosives) and "slow push" (such as the gravity tractor) ideas for deflecting asteroids will be discussed. SwRI provided detailed quantitative information on momentum enhancement and adjusting NEO trajectories through conventional means (conventional explosives and hypervelocity impactors) that was incorporated into NASA's 2007 Report to Congress entitled "Near-Earth Object Survey and Deflection: Analysis of Alternatives" and the more recent National Research Council report released in 2010. The talk discusses pros and cons of the proposed mitigation strategies and outlines what is required to address the impact threat. Further details can be found at http://www.swri.org/3pubs/ttoday/Spring09/Cosmic.htm.

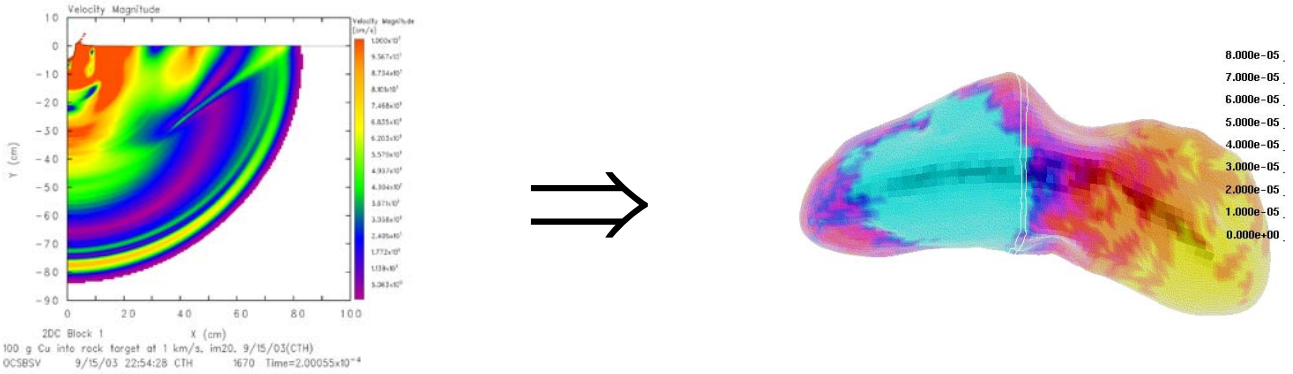

Figure: An impact computation's results (left) are transferred to a three-dimensional model of an asteroid to study the subsequent deformation (right).

Abstract: Impact Threats in the Space Program

There are a variety of impact threats in the space program. This talk presents three impact threats in which the speaker and Southwest Research Institute have been involved.

The foam strike on *Columbia* created a hole in reinforced carbon-carbon panel 8 that led to excessive heating during re-entry, loss of the integrity of the left wing, and subsequent loss of the vehicle and crew. In the two and a half years following the accident there was a concerted effort to understand the impact threat to the space shuttle system, before the launch of space shuttle *Discovery* on July 26, 2005. The presentation reviews the extensive experimental and modeling efforts related to impact in the return to flight program and includes test and simulation videos.

The New Horizons deep space probe is powered by radioisotope thermoelectric generators (RTG) based on the radioactive decay of plutonium. The third-stage self-destruct system for the Atlas V launcher consists of two shaped charges aimed at the top of the motor to burst the motor casing, reduce the internal pressure, and render the motor operationally inert. Our studies, both experimental and computational, identified the main threat and identified mitigation strategies to help lead to a successful launch in 2006.

The proposed Altair Lunar Lander was designed for the planned return to the Moon in 2020. Since the intent was to re-use lander components by later missions, studies examined the exposure threat to the lander sitting on the Lunar surface for extended periods. These threats involve both direct strikes of meteoroids on the vehicle as well as strikes from Lunar regolith and rock thrown by nearby meteorite strikes. Impact tests and analysis examined the impact threat to various components of the lander.

Details on SwRI's role in the *Columbia* investigation (and additional photographs) can be found at www.swri.edu/3pubs/ttoday/fall03/LeadingEdge.htm.

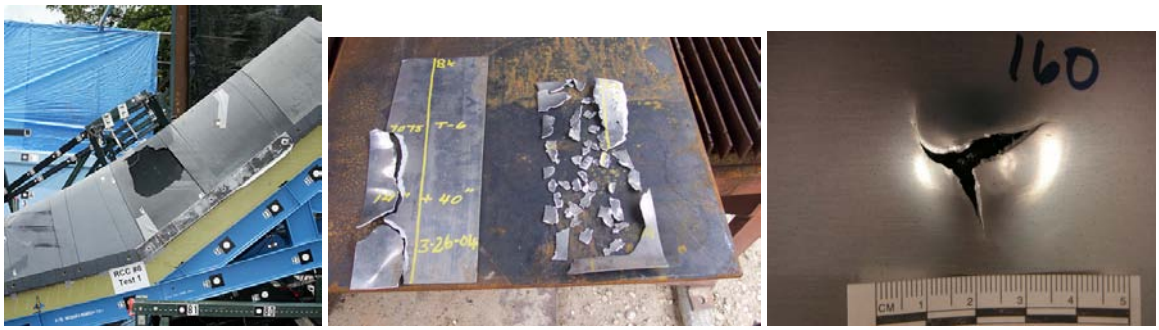

Figure. Impact tests on the space shuttle wing leading edge panels (left), components of the New Horizons third stage (center), and on an Altair pressure vessel wall (right).

RANDII R. WESSEN

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Biography:

Dr. Wessen has been an employee of the California Institute of Technology's Jet Propulsion Laboratory for twenty-four years. He is currently the Deputy Manager of the Project Formulation Office. Prior to this Dr. Wessen was the Navigator Program System Engineer. This program's goal is the detection of Earth-like planets around other stars, if they exist. He also was the Telecommunications & Mission Systems Manager for the Mars Program, the Supervisor for the Science System Engineering Group, Manager of the *Cassini* Science Planning & Operations Element, the *Galileo* Deputy Sequence Team Chief, and the *Voyager* Science Sequence Coordinator for the Uranus & Neptune encounters.

Dr. Wessen received his Bachelors of Science in both Physics and Astronomy from Stony Brook University, a Masters of Science in Astronautics from the University of Southern California, and a Doctorate in Operations Research from the University of Glamorgan, Wales, United Kingdom. He coauthored the books *Neptune: the Planet, Rings and Satellites* and *Planetary Ring Systems*. He was the recipient of NASA's Exceptional Service Medal for his contributions to the *Voyager 2* Neptune Encounter and has nine NASA Group Achievement Awards. Dr. Wessen is also a fellow of both the Royal Astronomical Society and the British Interplanetary Society.

Abstract: "The Future of U.S. Planetary Exploration"

Planetary exploration is composed of a number of evolutionary missions punctuated by a few revolutionary ones. Initially, planetary missions were sent on trajectories passed worlds for brief periods of time to determine their fundamental characteristics. Planetary exploration has now progressed to orbiter missions that remain in orbit for years at a time, enabling them to study atmospheric dynamics, surface morphology and magnetospheric science. *Orbiter* missions have been sent to Venus, Earth, Mars, Jupiter, and Saturn. Those targets, deemed sufficiently interesting, will have probes sent into their atmospheres or samples returned from their surfaces.

This presentation will discuss the robotic planetary missions currently in operations at the Jet Propulsion Laboratory and those planned for the upcoming decades. It will include descriptions of missions to the major planets, minor bodies and the search for "Terra Nova," the search for an Earth-like planet outside of our Solar System.

Abstract: "Market-based Systems for Solving Space Exploration Resource Allocation Problems"

Of the many aspects of space exploration history can record, the development of the spacecraft and its science payload has been anything but historic. Cost and mass growths can and do exceed 200% of their initial estimates. An innovative approach for allocating these scarce spacecraft resources has been developed which is based on the market forces of supply and demand. Its first application was to manage requests for additional resources during the development of *Cassini's* science instruments. *Cassini* is a Saturn orbiter currently in orbit about Saturn.
Upon the cancellation of its twin, the CRAF comet mission, *Cassini* needed a better approach to prevent science instrument mass, power, data rate and cost from expanding beyond their defined allocations. Excessive growth could produce the same fate experienced by CRAF for *Cassini.* Using a market-based system, *Cassini* was able to control their payload cost growth to only +1% and mass growth to – 7%! To date, market-based approaches have been applied experimentally to manifesting space shuttle secondary payloads, mission planning for the LightSAR RADAR mission and science planning for a Mars Lander mission.

This presentation will describe what experimental economics is, the two major types of systems, and results from the *Cassini* resource exchange, space shuttle manifest scheduling, and LightSAR mission planning when a market-based system was employed.

Abstract: “ORIGINS – The Astronomical Search for Origins and Planetary Systems”

Ever since we first looked up at the night sky, humans have been intrigued by two questions: Where did we come from? And are we alone?

Humankind is beginning to make progress in addressing these two timeless questions. This presentation will describe our current understanding of the:

1. Formation of galaxies, stars and planets
2. Search for planetary systems
3. Definition of habitable worlds
4. Planetary search techniques, and
5. Future missions that will carry out this effort, and continue our pursuit to understand the implications of these questions.

Addressing the issue of the possibility of life in the cosmos, Arthur C. Clarke said, “Sometimes I think we are alone in the Universe, and sometimes I think we’re not. Either answer is astounding!” Come hear how humanity is taking up this quest.

ROBERT C. “BOB” WINN

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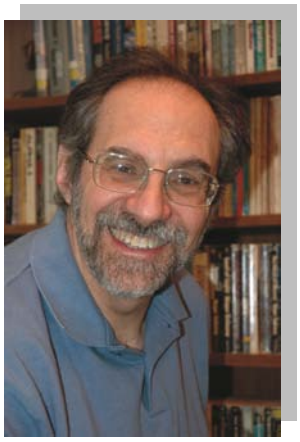
Biography:

Dr. Winn is a mechanical/aeronautical engineer, Principal and Chairman of the Board of Engineering Systems Inc. (ESI). ESI is a multidisciplinary company, which provides professional engineering services to industrial, legal and insurance firms, government agencies. and trade organizations and acts as consultants to other engineering firms. ESI provides a wide range of technical support capabilities, including metallurgical, materials, aeronautical, mechanical, structural, electrical, safety, automotive, and audio/visual services. Dr. Winn has been a consulting engineer since he retired from the U.S. Air Force in 1991 after a 22-year career. He has been with ESI since 1994. He was an instructor pilot in four different Air Force aircraft and served as Chief Scientist of the USAF European Office of Aerospace Research and Development in London, England. Dr. Winn spent over 15 years teaching aeronautical and mechanical engineering at the USAF Academy and Colorado Technical University. He is a Fellow of AIAA, Vice President of AIAA for Finance, and sits on the AIAA Board of Directors. He is a member of the Society of Automotive Engineers (SAE) and has served as a member of the SAE AC-9C Subcommittee on Aircraft Icing

Technology. Dr. Winn taught; directed research; published over 70 technical papers, technical reports, and articles; and has given numerous presentations on a wide variety of technical and educational topics.

Abstract: Mistakes and Deceptions in Aircraft Accident Reconstructions

After an airplane accident occurs, a lawsuit is sometimes filed. The plaintiffs and the companies being sued hire lawyers to help prosecute and defend against the lawsuit, and those lawyers often hire engineering experts to analyze the accident and explain to a jury what happened and why it happened. Often this analysis occurs years after the accident and uses such things as recorded radar data, wreckage and accident site inspection, and especially the laws of physics. In this presentation, I will describe the general approach that any good aircraft accident reconstructionist should follow. I will also give examples of mistakes and intentional deceptions that have been presented by experts in several accident investigations.



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Biography:

Robert Zimmerman is an award-winning science journalist and historian. His newest book, *The Universe In A Mirror: The Saga of The Hubble Space Telescope And The Visionaries Who Built It*, tells the story of the people who conceived, built, and saved the Hubble Space Telescope. His previous book, *Leaving Earth: Space Stations, Rival Superpowers, and The Quest For Interplanetary Travel*, was awarded the American Astronautical Society's Eugene M. Emme Astronautical Literature Award this year as the best space history for the general public. In addition, Mr. Zimmerman has written *Genesis, The Story Of Apollo 8*, published by Four Walls Eight Windows in 1998, which describes the family and political tale behind the first manned mission to another world, and *The Chronological Encyclopedia of Discoveries in Space*, published by Oryx Press in 2000, which is a detailed reference book describing what was accomplished on every space mission, beginning in October 1957 with Sputnik and continuing through December 1999.

Besides his books and writing over a hundred articles for *Science*, *Astronomy*, *Air & Space*, *Natural History*, *Sky & Telescope*, *The Wall Street Journal*, *USA Today*, *Invention & Technology,* and a host of other magazines, Mr. Zimmerman is also a cave explorer and cartographer, and has participated in a number of projects exploring virgin caves across the eastern United States. It is this activity that has given him the fortunate opportunity to actually "go where no one has gone before."

New Topics:

- Predicting the future of space travel, based on the past.
- Fixing what's broke: A history of manned servicing in space

Other Topics:

- The story behind the Hubble Space Telescope and its importance to science and the future.
- The story of the *Apollo 8* mission to the moon in December 1968 and how it won the 1960s space race.
- The history of manned spaceflight since *Apollo*, when the Russians overtook the U.S. in space.
- The story of NASA, now and into the future.
- Unknown stories from space: astronaut adventures that did not reach the press