

54th AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference

21st AIAA/ASME/AHS Adaptive Structures Conference

15th AIAA Non-Deterministic Approaches Conference

14th AIAA Dynamics Specialists Conference

14th AIAA Gossamer Systems Forum

9th AIAA Multidisciplinary Design Optimization Specialist Conference

8–11 April 2013

Boston Park Plaza
Hotel & Towers

Boston, Massachusetts

www.aiaa.org/sdm2013



CALL FOR PAPERS

Abstract Deadline: 5 September 2012



Who Should Submit a Paper?

Program Managers

Engineers

Academics

Why Submit a Paper?

Worldwide Exposure

Your paper will be added to the AIAA Electronic Library, the largest aerospace library in the world. More than two million searches are performed every year, with 150 institutions as subscribers!

Respect

When you publish with AIAA, you know that your name is connected with the most prestigious publication in the aerospace field.

Networking

Build your professional network when you interact with peers during your paper presentation.

IMPORTANT DATES

Website Open for Abstract Submission
9 May 2012

Abstract Deadline
5 September 2012

Author Notification
28 November 2012

Final Manuscript Deadline
19 March 2013

54th AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference

General Chair

Anthony M. Waas
University of Michigan
734.764.8227
Email: dcw@umich.edu

Technical Program Chair

Ajit K. Roy
Air Force Research Laboratory
937.255.9034
Email: ajit.roy@wpafb.af.mil

Student Papers Technical Chair

John D. Whitcomb
Texas A&M University
979.845.4006
Email: jdwh@tamu.edu

Materials Genome to Flight-Worthy Innovative Structures

The 54th Structures, Structural Dynamics, and Materials Conference (SDM) is sponsored by AIAA, ASME, ASCE, AHS, and ASC. This established annual conference is a widely acknowledged event that provides a unique forum dedicated to the latest developments in the collective disciplines of structures, structural dynamics, materials, design engineering, and survivability. The 54th Conference will also host the 21st AIAA/ASME/AHS Adaptive Structures Conference, the 15th AIAA Non-Deterministic Approaches Conference, the 14th AIAA Dynamic Specialist Conference, the 14th AIAA Gossamer Systems Forum, and the 9th AIAA Multidisciplinary Design Optimization Specialist Conference. Plenary presentations, given by recognized, forward-thinking invited speakers, will be a special feature of the conference. This year's presentations will address integration of fundamentals of materials development to structural design to enable accelerated materials technology transition to efficient and innovative flight-worthy aircraft and spacecraft structures.

Structures

The field of structures encompasses the mechanics of metallic and nonmetallic components and their composite derivatives obeying elastic and inelastic constitutive laws. Specific areas of interest include the following: thermal response; structural stability and post-buckling behavior; computational structural mechanics; non-deterministic methods, probabilistic design,

and uncertainty analysis; weight, reliability, and design cycle cost tradeoffs; structural integrity; durability and damage tolerance; damage detection, structural health monitoring, and novel repair concepts; advanced applications; development; verification, validation, and qualification; knowledge-based engineering; and simulation-based design. Also of interest are papers outlining structural development, analysis, and testing related to current programs and events such as Space Shuttle replacement, space exploration, and current civil and military aircraft programs. Papers are particularly encouraged that emphasize the development and fielding of innovative structural systems including multifunctionality; coupling among computational, analytical, and experimental methods; coupling of design and manufacturing to enhance affordability; and techniques for design/analysis cycle time reduction.

Structural Dynamics

The field of structural dynamics covers experimental, analytical, and computational methods for determining the response of aerospace systems to a variety of external and internal disturbance sources. Papers are solicited that address linear and nonlinear response of systems due to gusts, acoustics, impact, shock, thermal, and operational loads. In addition, papers are requested that describe the development and implementation of active/passive approaches to vibration suppression, aeroelasticity, and fluid-structure interactions in fixed-wing and rotary-wing aircraft, spacecraft, and hypersonic vehicles with transient thermally induced dynamic loads.

Materials

In the field of materials, papers are sought on topics related to current and cutting-edge research and development of aerospace and non-aerospace materials. Submissions are encouraged in topic areas that include modeling, synthesis, processing, testing, and characterization. Application papers may include, but are not limited to, structural and nonstructural, adaptive, smart, and affordable materials. Special focus areas include multifunctional materials and their effects on structural systems, material development, constitutive models, novel experimental methods, coatings and protection, optimization, trade studies, lifecycle studies, affordability, inspection, repair, maintenance, and environmental impact. Papers on experimental and analytical methods that lead to understanding of mechanical performance, environmental sensitivity, fatigue and fracture, time- and rate-dependent behavior, durability, damage tolerance, aging, and in-service performance are included in this solicitation. Special emphasis will be given to new and emerging technologies, such as nanostructured materials, multidimensional composites, cryogenic materials, advanced fiber forms, polymers, metallics, lightweight and super-lightweight materials, and multifunctional materials.

Design Engineering

Papers are solicited on current design engineering and design process activities. Design-oriented papers should focus on



innovative, novel, or otherwise distinctive designs or concepts resulting in or leading toward products that effectively satisfy requirements or demonstrate design efficiency improvements. Emphasis on current aerospace programs such as commercial access to space, very light business jets, NASA Environmentally Responsible Aviation, ESTOL, satellites, missile systems, Unmanned Air Systems, and service life extension projects are encouraged. The definition, application, and implementation of emerging design tools resulting in significant design-cycle time reduction and reduced program cost and risk should be emphasized.

Design process-oriented papers should focus on current design engineering process activities, such as process definition, analysis, architecture, and metrics, as applied to aerospace hardware products from the exploratory design phase through the detailed design phase. Papers on the advances in model based design processes and related activities are especially encouraged. Other design engineering process-related activities that may be addressed are the interaction between processes and tools, impact of tool integration on a process, and risk reduction from the use of higher-fidelity tools earlier in the design process. Other enablers to reducing design-cycle time and cost while increasing the ability to meet all cost, schedule, and technical requirements may also be addressed.

Education-oriented papers are solicited that emphasize design in curriculum development, class content and student activities. Successful examples are especially requested.

Survivability

The field of survivability encompasses technologies for assessing and improving the survivability of air and space platforms. Papers are solicited on such topics as integrated subsystem design for survivability, survivability assessment, susceptibility and vulnerability reduction, and survivability/susceptibility/vulnerability modeling and simulation methodologies. Air system survivability topics also include end-game and hit-point analysis, common issues between safety and survivability, live-fire testing, and damage repair. Space system survivability topics may address directed energy and kinetic energy threats as well as natural hazards such as radiation and the meteoroid/orbital debris environment.

Wind Energy Technology

For a fifth consecutive year, papers are solicited for a broad range of topics related to structures, structural dynamics and materials research, development, and applications to wind energy technology. Materials topics include composites and new material characterization, fatigue and failure analyses, structural joining, and coatings and core materials for blades. In the area of aeroelasticity, topics include fluid structure interaction, computational and analytical methods, reduced-order modeling, and stability analysis. Blade and turbine design and analysis topics include structural and structural dynamics analysis, structural optimization, multi-objective design, damping devices, and full system dynamics modeling.

A number of emerging areas of research are also of interest including innovations for large wind turbine structures, offshore technology, turbine controls for load alleviation and energy capture improvement, loads estimation and loads forecasting, system identification including operational modal analysis (OMA), adaptive structures, novel sensors and actuators, structural health monitoring, verification and validation, acoustics and thermal applications, and probabilistic methods.

Specially Organized Technical Sessions

Individuals or groups who wish to organize paper sessions or panel discussions that focus on specific topical issues should provide detailed information to the Technical Program Chair by 9 July 2012 that describes the background of the proposed session, its topical issues and potential speakers, and clearly identifies the organizers and participants. Abstracts submitted for the special session must be submitted by 5 September 2012 online at www.aiaa.org/sdm2013 for inclusion in the normal paper selection process.

Student Papers

Student papers should report on work primarily conducted by students in collaboration with their faculty advisors; therefore, all primary authors of papers submitted as student papers must be students at the time the abstract is submitted for consideration. Student papers will be presented during regular sessions and will be suitably recognized. A limited number of students will receive recognition for their papers at the SDM conference awards luncheon. Student paper awards include the Jefferson Goblet Student Paper Award, the Harry H. and Lois G. Hilton Student Paper Award in Structures, the Lockheed Martin Student Paper Award in Structures, and the American Society for Composites Student Paper Award. Student paper awardees will be selected on the basis of paper quality and the effectiveness of the students' presentations. Finalists for student paper awards will be required to present their papers in both the assigned conference technical session and possibly in an additional evening award selection session prior to the conference awards luncheon. Award selection panels are comprised of representatives from SDM technical committees. Papers not presented by students will not qualify for awards. Interested individuals should submit abstracts clearly identified as student papers through AIAA's website at www.aiaa.org/sdm2013 by 5 September 2012. Full papers accepted for conference presentation are due 19 March 2013. The notation "SDM 2013 Student Papers Competition" must be placed above the title of the paper on the first page of the abstract to be eligible for the competition. Questions about the abstracts themselves or manual abstract submissions should be referred to the Student Papers Technical Chair, Prof. John D. Whitcomb, Aerospace Engineering Department, Texas A&M University, email: jdw@tamu.edu.

21st AIAA/ASME/AHS Adaptive Structures Conference

General Chair

David F. Voracek

NASA Dryden Flight Research Center
661.276.2463

Email: david.f.voracek@nasa.gov

Technical Program Chair

Ratneshwar (Ratan) Jha

Clarkson University

315.268.7686

Email: rjha@clarkson.edu

The 21st Adaptive Structures Conference, sponsored by AIAA, ASME, and AHS, will be held in conjunction with the 54th Structures, Structural Dynamics, and Materials Conference. The Adaptive Structures Conference is the premier conference focused on the advancement of adaptive structures technology and its application to aerospace systems. This conference brings together basic and applied researchers from diverse disciplines in academia, government, and industry; as such, the range of relevant topics is quite broad. Topics may include, but are not limited to:

- adaptive and morphing aircraft (fixed, rotary, and flapping wing aircraft as well as hybrids)
- adaptive space and planetary vehicles and systems
- modeling, simulation, optimization, design, validation, and certification of adaptive and multifunctional structures
- structural health monitoring for damage detection and material state awareness
- data and information processing for structural health management
- novel structural concepts to support adaptive structures
- active noise, vibration, and aeroelastic control
- smart sensor and actuator device design and structural integration
- smart and multifunctional materials including formulation, characterization, long term durability, and modeling

Please join us in Boston with researchers from around the world at the foremost conference on Adaptive Structures.

15th AIAA Non-Deterministic Approaches Conference

General Chair

Gianluca Iaccarino

Mechanical Engineering & Institute for Computational and Mathematical Engineering
Stanford University
650.723.9599
Email: jops@stanford.edu

Technical Program Chair

Ben Thacker

Southwest Research Institute
210.522.3896
Email: bthacker@swri.org

The need for Non-Deterministic Approaches (NDA) to manage uncertainty is well recognized within the aerospace industry. These approaches, which include both probabilistic and non-probabilistic methods, provide treatment of high consequence of failure events associated with the development and operation of aerospace systems. The NDA conference is dedicated to the development and dissemination of nondeterministic perspectives, methods, and applications.

Authors are invited to submit abstracts for papers on all aspects of non-deterministic approaches associated with the design, analysis, manufacturing, fabrication, operation, structural health management, and condition based maintenance of aerospace systems. Applications of non-deterministic approaches to emerging technologies such as biotechnology, genetics, social dynamics, nanotechnology, and information technology are also welcome. Previous NDA papers have featured the development of general non-deterministic approaches and applications in the following areas: fundamental analytical NDA solution methods; stochastic simulation and stochastic finite element methods; reliability-based optimization and design; random fatigue and fracture; materials characterization; simulation, assessment, and certification of multidisciplinary systems; structural health management; reliability updating; and model verification and validation, among many others.

14th AIAA Dynamics Specialists Conference

General Chair

John B. Kosmatka

University of California, San Diego
858.534.1779
Email: jkosmatka@ucsd.edu

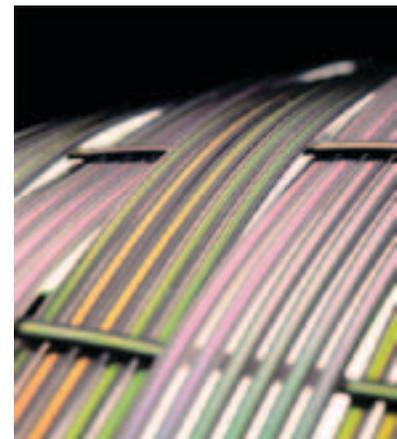
Technical Program Chair

Joseph C. Slater

Wright State University
937.775.5001
Email: joseph.slater@wright.edu

The 14th AIAA Dynamics Specialists Conference will be held in conjunction with the 54th Structures, Structural Dynamics, and Materials Conference. The conference theme is emerging structural dynamics technologies that will enable development of the next generation of aerospace vehicle systems including Micro Air Vehicles (including flapping wing approaches), Unmanned Air Vehicles, Rotorcraft and Tilt-Rotors, Composite Business Jets and Transports, Military Aircraft, Quiet Supersonic Aircraft, Hypersonic Vehicles, Commercial Launch Vehicles, Space Exploration Vehicles, Ultralight (thin-membrane or sandwich) Structures, Turbomachinery, and Next Generation Large-Scale Off-Shore Wind Turbines.

The focus is on unique structural dynamic issues and their solutions which will enable these new systems to meet or exceed their requirements. Areas of specific interest include, but are not limited to: structural dynamics; nonlinear dynamics and stability; passive damping and active control; aeroelasticity (including computational fluid dynamic modeling approaches, reduced order aerodynamic models for nonlinear analyses, modeling uncertainties, and innovative experimental approaches); aeroservoelasticity; aerothermoelasticity; dynamic test techniques; aircraft loads and dynamics; extreme loading environments; acoustics and noise; limit cycle oscillation; energy harvesting, and structural health monitoring and prognosis.



14th AIAA Gossamer Systems Forum

General Chair

James D. Moore
ManTech Nexolve
256.971.7000
Email: Jim.Moore@nexolve.com

Technical Program Chair

Jeremy A. Banik
Air Force Research Laboratory
Kirtland AFB
505.846.9369
Email: Jeremy.Banik@kirtland.af.mil

An emerging class of large-scale, lightweight structures is enabling a paradigm shift in design, launch, and operation of spaceflight systems. Spacecraft with structural characteristics optimized for operation in space and for the ability to collapse into small packages for launch yield order-of-magnitude reductions in mass, launch volume, and life-cycle cost of large spaceflight systems. The objective of the Gossamer Systems Forum is to provide an opportunity to discuss recent research findings and newly proposed concepts emerging from this technology. Subjects of interest include requirements, systems, analyses, design, materials, subsystems, manufacturing, qualification, standards, and databases related to lightweight spacecraft systems and/or deployable spacecraft systems. Applications of interest for space systems include, but are not limited to, antennas, radiators, sun shields, solar sails, solar arrays, reflectors, concentrators, optics, telescopes, collectors, occulters, habitats, ballutes, and landing balloons. Papers of interest include technical issues related to system concepts, applications, simulation tools, pressurization, materials, structures, structural dynamics, controls, thermal control, rigidization, deployment, packaging, mechanisms, space environmental effects, ground testing, model verification, manufacturing inspection, flight testing, and other activities necessary for development of reliable gossamer-class spacecraft systems.

9th AIAA Multidisciplinary Design Optimization

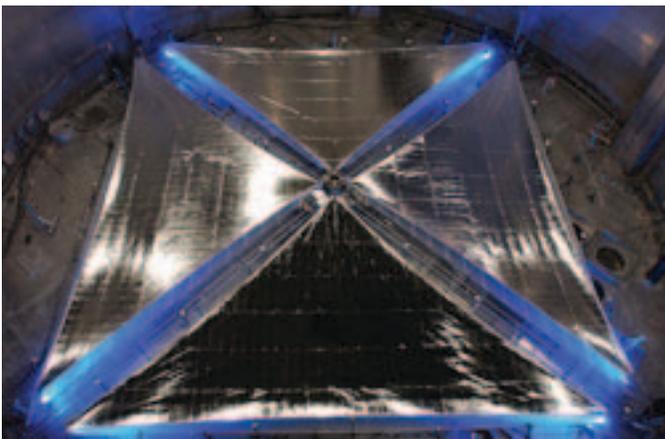
General Chair

Maxwell Blair
Air Force Research Laboratory
937.255.8430
Email: maxwell.blair@wpafb.af.mil

Technical Program Chair

Andy Ko
AVID LLC
540.961.0067
Email: ako@avidaerospace.com

Multidisciplinary design optimization (MDO) focuses on optimizing the performance and reducing the costs of complex systems that involve multiple interacting disciplines, such as those found in aircraft, spacecraft, automobiles, industrial manufacturing equipment, and various consumer products, and also on the development of related methodologies. MDO is a broad area that encompasses design synthesis, sensitivity analysis, approximation concepts, optimization methods and strategies, artificial intelligence, and rule-based design—all in the context of integrated design dealing with multiple disciplines and interacting subsystems or systems of systems. Contributions to large-scale MDO applications in high performance and distributed computing environments, novel visualization and interaction approaches, and single discipline optimization methods—provided they enhance and support multidisciplinary applications—are also welcome.



Abstract Submittal Guidelines

Abstract submissions will be accepted electronically through www.aiaa.org/sdm2013. The website will open for abstract submission on **9 May 2012**. The deadline for receipt of abstracts via electronic submittal is 5 September 2012.

Authors having trouble submitting abstracts electronically should email ScholarOne technical support at ts.acsupport@thomson.com. Questions about the abstracts themselves should be referred to the appropriate Technical Program Chair.

The deadline for receipt of abstracts via electronic submission is **5 September 2012, 2359 hrs**, Eastern Time, USA.

Selection of papers for all conference sessions will be based on extended abstracts of no less than 1,000 words (5 to 6 pages in length with 12 point font, including cover page, figures, tables and text) in which the authors must clearly identify the aspects of the work that are new and significant. The extended abstract or draft paper should clearly describe the purpose and scope of the work to be included in the final manuscript, methods used, key results, and contributions to the state of the art. The submittal should include illustrations and data that support the results and contributions asserted.

Both abstracts and final manuscripts must adequately address the accuracy of results. Abstracts will be reviewed and selected based on technical content, originality, importance to the field, clarity of presentation, accuracy validation, and the potential to result in a quality final manuscript. Note that all abstracts are chosen by a competitive process based on anonymous peer review using these criteria. The review and acceptance process will be weighted in favor of authors submitting

more relevant documentation of their proposed papers. The length of the final manuscript should be appropriate for a conference paper, not a major project, final report, or final thesis.

The abstract should not be submitted to more than one technical topic. If an author is unsure which topic is most appropriate, it is the author's responsibility to communicate with the technical topic organizers in question well before the abstract deadline to determine the topic area under which the abstract best fits. There will be too little time in the review process for an abstract rejected by one topic to be considered for review under another.

Questions pertaining to the abstract or technical topics should be referred to the corresponding technical topic chair.

Authors will be notified of paper acceptance or rejection on or about **28 November 2012**. Instructions for preparation of final manuscripts will be provided by AIAA for accepted papers only.

"No Paper, No Podium" Policy

If a written paper is not submitted by the final manuscript deadline, authors will not be permitted to present the paper at the conference. It is the responsibility of those authors whose papers or presentations are accepted to ensure that a representative attends the conference to present the paper. This policy is intended to improve the quality of the conference for attendees.

Publication Policy

AIAA will not consider for presentation or publication any paper that has been or will be presented or published elsewhere. Authors will be required to sign a statement to this effect.

Final Manuscript Guidelines

An Author's Kit containing detailed instructions and guidelines for submitting papers will be made available to authors of accepted papers. Authors must submit their final manuscripts via the conference website no later than **19 March 2013**.

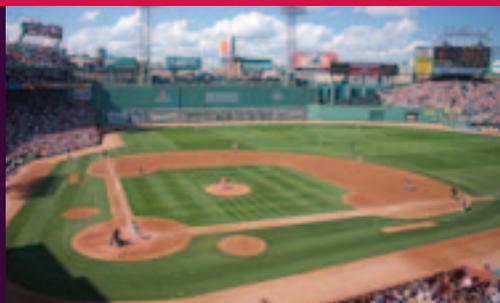
WARNING—Technology Transfer Considerations

Prospective authors are reminded that technology transfer guidelines have considerably extended the time required for review of abstracts and completed papers by U.S. government agencies. Internal (company) plus external (government) reviews can consume 16 weeks or more. Government review if required is the responsibility of the author. Authors should determine the extent of approval necessary early in the paper preparation process to preclude paper withdrawals and late submissions. The conference technical committee will assume that all abstracts, papers, and presentations are appropriately cleared.

International Traffic in Arms Regulations (ITAR)

AIAA speakers and attendees are reminded that some topics discussed in the conference could be controlled by the International Traffic in Arms Regulations (ITAR). U.S. nationals (U.S. citizens and permanent residents) are responsible for ensuring that technical data they present in open sessions to non-U.S. nationals in attendance or in conference proceedings are not export restricted by the ITAR. U.S. nationals are likewise responsible for ensuring that they do not discuss ITAR export-restricted information with non-U.S. nationals in attendance.

www.aiaa.org/sdm2013



ABOUT BOSTON

Boston can perhaps be best described as a welcome contradiction: Hip alongside historic. Skyscrapers surround parks. Gourmet meets pizza.

There's history and culture around every bend in Boston—skyscrapers nestle next to historic hotels while modern marketplaces line the antique cobblestone streets. When visiting Boston, you'll discover neighborhoods with distinct character, quaint brownstone-lined streets, the beloved Red Sox, and big-city entertainment.

8–11 April 2013

Boston Park Plaza Hotel & Towers
Boston, Massachusetts