SSDM 2025

AEROSPACE STRUCTURES, STRUCTURAL DYNAMICS, AND MATERIALS

PROGRAM

CONFERENCE
MAY 5 – 7, 2025

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HOUSTON MEMORIAL CITY
HOUSTON, TX

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Dear Esteemed Attendees,

It gives us great pleasure to welcome you to the third edition of the Aerospace Structures, Structural Dynamics, and Materials (SSDM) Conference in Houston, USA! We are thrilled to have you join us for this exciting three-day event.

The mission of SSDM is to convene and serve the global aerospace structures, structural dynamics, and materials communities by providing a unique venue for researchers, engineers, and practitioners from around the world to share their latest findings and insights on the latest advances in the fields of aerospace structures, structural dynamics, and materials. The conference program has been thoughtfully designed to provide you with the latest information and insights while also allowing ample opportunities for networking and collaboration. SSDM seeks to rally all the talents the world has to meet current and future challenges of aerospace structures, structural dynamics, and materials.

During the conference, you will have the opportunity to attend four plenary lectures, three track keynotes, and parallel technical sessions, covering a broad range of topics such as advanced manufacturing of aerospace structures and materials, applications of AI/ML in aerospace structures and materials, space structures, hypersonic vehicles, eVTOLs, and many others. The conference will also feature an award luncheon where we will recognize accomplished colleagues in our community and inspire the younger generations.

We are grateful for the visionary leadership from the ASME Aerospace Division, which gave birth to SSDM. We also want to sincerely thank the dedicated support from ASME staff, without whom it would be impossible to present this wonderful conference to you. Lastly, we deeply appreciate our advisory committee members, plenary speakers, track keynoters, topic organizers, authors, session chairs, and sponsors. Without their combined efforts, this SSDM conference would not be possible.

We are confident that you will find the ASME SSDM Conference to be a valuable and enriching experience. We encourage you to take advantage of the many opportunities for learning, networking, and collaboration that the conference has to offer. Afterward, we will invite your feedback to help us prepare for SSDM 2026.

Thank you for your participation and contributions to the success of this conference.

ASME SSDM Organizing Committee:

Erkan Oterkus, Wenbin Yu, Erasmo Carrera, Yongming Liu,

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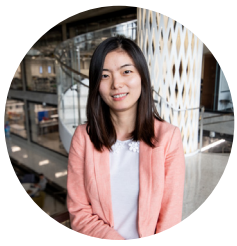

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CONFERENCE INFORMATION

REGISTRATION

Ballroom Foyer, Level 4

Registration Hours:

Sunday, May 4	2:00PM–5:00PM
Monday, May 5	7:00AM–5:00PM
Tuesday, May 6	7:00AM–5:00PM
Wednesday, May 7	7:00AM–12:00PM

BADGE REQUIRED FOR ADMISSION

All conference attendees must have an official AS ME SS DM 2025 badge at all times in order to gain admission to technical sessions, plenaries, and other conference events. Without a badge, you will not be granted admission to conference activities.

SPONSOR EXHIBIT HOURS

Visit our sponsors during the conference in the Ballroom Foyer, Level 4, during registration hours. Be sure to check them out!

PRESENTER ATTENDANCE POLICY

According to ASME's Presenter Attendance Policy, if a paper is not presented at the conference, the paper will not be pub-lished in the official Archival Proceedings, which are registered with the Library of Congress and are abstracted and indexed. The paper also will not be published in the ASME Digital Collec-tion and may not be cited as a published paper . SESSION ROOM EQUIPMENT: Each session room is equipped with a screen, LCD projector, and laptop. Speakers should have a copy of their presentation loaded onto a memory stick. It is recommended that authors/speakers bring all visual aids with them.

ASME EVENTS APP

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You will be able to:
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• Search and Access Session Information
• Download Final Papers
• And More!
*All features may not be available at all events.

Keep an eye on your email for more information on how to access and navigate the ASME Events App!

CONFERENCE MEALS

Breakfast will be served daily in Azalea 1-3 between 7:00AM and 7:45AM.
The Awards Luncheon will be on Tuesday, May 6, from 11:45AM to 1:45PM in the Azalea 1-3, where we will celebrate a select group for their contributions and achievements in aerospace engineering.

OPENING RECEPTION

Monday, May 5
6:00PM–7:00PM
Hibiscus Ballroom

BEVERAGE BREAKS

Morning and afternoon breaks will be provided in the Ballroom Foyer, Level 4. Come and meet our sponsors and join your fellow attendees for a few minutes of networking and discussion.
The schedule is as follows:

Monday, May 5	3:15PM–3:45PM
Tuesday, May 6	4:00PM–4:30PM

CONFERENCE INFORMATION

PHOTOGRAPHS/VIDEO/AUDIO RECORDINGS

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CONFERENCE PROCEEDINGS

Each attendee will receive an email with a unique code to access digital copies of all the papers accepted for presentation at the conference. The official conference archival proceedings will be published after the conference and will not include accepted papers that were not presented at the conference. The official conference proceedings are registered with the Library of Congress and are submitted for abstracting and indexing. The proceedings are published on the ASME Digital Library. You will be provided with an individual link to the online papers via email. In the event you do not receive the email, send a request to conferencepubs@asme.org.

SSDM 2025 TOPICS & TOPICS ORGANIZERS

THANK YOU! Thank you to our Topic Organizers! Without their dedication and time commitment, SSDM could not be a successful conference.

STRUCTURES TOPICS	STRUCTURES TOPIC ORGANIZERS
General Topics of Aerospace Structures	Xin-Lin Gao and Ibrahim Guven
Adaptive and Multifunctional Structures	Xin-Lin Gao and Yeqing Wang
Advanced Manufacturing for Aerospace Structures	Yingtao Liu, Dong Lin, and Christopher Billings
Advances in Aerospace Structures	Luciano Demasi and Wei Zhao
Applications of Artificial Intelligence/Machine Learning for Aerospace Structures	Yongming Liu, Xin Liu, and Fei Tao
Impact, Fatigue, Damage, and Fracture of Composite Structures	Mehmet Dorduncu, Masaaki Nishikawa, and Weiyi Lu
Nonlinear Problems in Aerospace Structures	Erasmo Carrera and Alfonso Pagani
Nondestructive Evaluation and Structural Health Monitoring	Erkan Oterkus, Kaan Ozenc, and Xiaowei Deng
Peridynamics and Its Applications	Erdogan Madenci, Selda Oterkus, Ibrahim Guven, Konstantin Naumenko, and Christian Willberg
Structures in Extreme Environments	Ibrahim Guven and Zafer Kazanci

STRUCTURAL DYNAMICS TOPICS	STRUCTURAL DYNAMICS TOPIC ORGANIZERS
General Topics of Structural Dynamics of Aerospace Structures	Weihua Su
Aero-, Servo-, Thermo-Elastic Optimization of Aerial Vehicles	Daning Huang
Aero-, Servo-, Thermo-Elasticity of Fixed-Wing Vehicles of All Scales	Daning Huang and Matteo Filippi
Aeroelasticity and Aeromechanics of Rotorcraft, Vertical Lift Aircraft, and eVTOL	Marco Petrolo and Jinwei Shen
Structural Dynamics of Launch Vehicle and Spacecraft	Yi Wang
Structural Dynamics and Control of Morphing Wing and Smart Structures	Wei Zhao
Nonlinear Dynamics, Flexible Multibody Dynamics	Matteo Filippi and Jinwei Shen
Dynamic Loads, Response, Vibration, and Alleviation of Aerospace Structures	Marco Petrolo
Computer Methods and Reduced Order Modeling	Yi Wang
Experimental Studies in Structural Dynamics	Weihua Su
Machine Learning in Structural Dynamics and Aeroelasticity	Zahra Sotoudeh and Marco Petrolo
Model Uncertainties and Uncertainty Quantification in Structures and Structural Dynamics	Weihua Su

MATERIALS TOPICS	MATERIALS TOPIC ORGANIZERS
General Topics of Aerospace Materials	Navid Zobeiry and Yongming Liu
Advanced Manufacturing	Dwayne Arola and Xiangyang Dong
Damage, Fatigue, and Fracture	Trisha Sain and Md Rassel Raihan
Emerging Materials Technology	Aniruddh Vashisth and Shanmugam Kumar
Integrated Computational Materials Engineering	Marco Salviato and Enrico Zappino
Materials Development Using Artificial Intelligence	Marco Petrolo, Navid Zobeiry, Yongming Liu, and Joshua Stuckner
Materials for Extreme Environments	Alexandru Stere, Dragos Margineantu, and Vishnu Saseedran
Micromechanics and Multiscale Modeling	Marianna Maiaru, Gregory Odegard, and Haoyan Wei
Multifunctional Materials	Aniruddh Vashisth, Shanmugam Kumar, and Ajit Roy
Nanomaterials	Samit Roy and Jingyao Dai
Testing and Characterization	Mahesh Chengalva and Rassel Raihan
Surface and Interface	Yao Qiao
Composites Design for Automated Fiber Placement and Additive Manufacturing	Satchi Venkataraman, Mehran Tehrani, and Paul Davidson

SSDM 2025 SESSION ORGANIZERS

Session Title	Session Organizer
01-01-01: General Topics of Aerospace Structures 1	Hailong Chen
01-01-02: General Topics of Aerospace Structures 2	Ali Najafi
01-02-01: Adaptive and Multifunctional Structures 1	Fabien Royer
01-02-02: Adaptive and Multifunctional Structures 2	Zubaer Hossain
01-02-03: Adaptive and Multifunctional Structures 3	Zubaer Hossain
01-03-01: Advanced Manufacturing for Aerospace Structures	Yingtao Liu
01-04-01: Advances in Aerospace Structures 1	Erkan Oterkus & Ibrahim Guven
01-04-03: Advances in Aerospace Structures 3	Luciano Demasi
01-05-01: Applications of Artificial Intelligence/Machine Learning for Aerospace Structures 1	Fei Tao
01-05-02: Applications of Artificial Intelligence/Machine Learning for Aerospace Structures 2	Selda Oterkus
01-06-01: Impact, Fatigue, Damage, and Fracture of Composite Structures 1	Mehmet Dorduncu
01-06-02: Impact, Fatigue, Damage, and Fracture of Composite Structures 2	Masaaki Nishikawa
01-06-03: Impact, Fatigue, Damage, and Fracture of Composite Structures 3	Weiyi Lu
01-07-01: Nonlinear Problems in Aerospace Structures	Alberto Pirrera
01-08-01: Nondestructive Evaluation and Structural Health Monitoring 1	Erkan Oterkus
01-08-02: Nondestructive Evaluation and Structural Health Monitoring 2	Hailong Chen
01-08-03: Nondestructive Evaluation and Structural Health Monitoring 3	Yingtao Liu
01-09-01: Peridynamics and Its Applications 1	Ibrahim Guven
01-09-02: Peridynamics and Its Applications 2	Erdogan Madenci
01-09-03: Peridynamics and Its Applications 3	Alfonso Pagani
01-10-01: Structures in Extreme Environments	Alexandru Stere
01-11-01: Wind Energy	Pablo Jaen Sola
01-12-01: Spacecraft Structures 1	Sergio Pellegrino
01-12-02: Spacecraft Structures 2	Kawai Kwok
01-12-03: Spacecraft Structures 3	Sergio Pellegrino
02-01-01: Aero-, Servo-, Thermo-Elasticity of Aircraft, Rotorcraft, and Spacecraft	Daning Huang
02-01-02: Aero-, Servo-, Thermo-Elasticity of Aircraft, Rotorcraft and Spacecraft	Daning Huang
02-02-01: Nonlinear Dynamics, Flexible Multibody Dynamics and Rotordynamics	Matteo Filippi

02-03-01: Dynamic Loads, Wave Propagations, Response, Vibration, Control, and Alleviation of Aerospace Structures and Vehicles	Sicheng He
02-03-02: Dynamic Loads, Wave Propagations, Response, Vibration, Control, and Alleviation of Aerospace Structures and Vehicles	Sicheng He
02-03-03: Dynamic Loads, Wave Propagations, Response, Vibration, Control, and Alleviation of Aerospace Structures and Vehicles	Sicheng He
02-04-01: Computer Methods and Reduced Order Modeling	Yi Wang
02-04-02: Computer Methods and Reduced Order Modeling	Yi Wang
02-05-01: Experimental Studies in Structural Dynamics	Weihua Su
02-06-01: Machine Learning in Structural Dynamics and Aeroelasticity	Marco Petrolo
02-07-01: Model Uncertainties and Uncertainty Quantification in Structures and Structural Dynamics	Wen Luo
03-02-01: Advanced Manufacturing	Dwayne Arola
03-02-02: Advanced Manufacturing	Dwayne Arola
03-03-01: Applications of AI	Navid Zobeiry
03-03-02: Applications of AI	Navid Zobeiry
03-04-01: Architected Materials/Metamaterials	Yunlan Zhang
03-04-02: Architected Materials/Metamaterials	Yunlan Zhang
03-05-01: Bioinspired Materials	Vanessa Restrepo Perez
03-06-01: Damage, Fatigue, and Fracture	Marco Salviato
03-06-02: Damage, Fatigue, and Fracture	Marco Salviato
03-06-03: Damage, Fatigue, and Fracture	Marco Salviato
03-07-01: Emerging Materials Technology	Shanmugam Kumar
03-07-02: Emerging Materials Technology	Shanmugam Kumar
03-08-01: Integrated Computational Materials Engineering	Enrico Zappino
03-09-01: Materials for Extreme Environments	Yin Fan
03-10-01: Micromechanics and Multiscale Modeling	Samit Roy
03-10-02: Micromechanics and Multiscale Modeling	Haoyan Wei
03-11-01: Multifunctional Materials	Mohammad Naraghi
03-13-01: Testing and Characterization	Yeqing Wang
03-13-02: Testing and Characterization	Mdrassel Raihan
03-15-01: Structural Bonding and Surface Modifications	Yao Qiao

SSDM 2025 SCHEDULE AT A GLANCE

Schedule Subject to Change

Central Time	Sunday – May 4, 2025
2:00PM–5:00PM	Registration

Central Time	Monday – May 5, 2025
7:00AM–5:00PM	Registration
7:00AM–7:45AM	Breakfast (provided)
8:00AM–9:00AM	Plenary - Daniel J. Inmann - University of Michigan
9:15AM–10:05AM	Track Keynote - Stewart Silling - Sandia National Laboratories
9:15AM–11:45AM	Technical Sessions
11:45AM–1:15PM	Lunch Break (on own)
1:15PM–3:15PM	Technical Sessions
3:15PM–3:45PM	Break
3:45PM–5:45PM	Technical Sessions
6:00PM–7:00PM	Evening Reception

Central Time	Tuesday – May 6, 2025
7:00AM–5:00PM	Registration
7:00AM–7:45AM	Breakfast (provided)
8:00AM–9:00AM	Plenary - Grama Bhashyan, Ansys
9:15AM–10:05AM	Track Keynote - Sondipon Adhikari - The University of Glasgow
9:15AM–11:45AM	Technical Sessions
11:45AM–1:45PM	Awards Luncheon
2:00PM–4:00PM	Technical Sessions
4:00PM–4:30PM	Break
4:30PM–6:00PM	Technical Sessions
6:00PM–8:00PM	Technical Committee Meetings

Central Time	Wednesday – May 7, 2025
7:00AM–12:00PM	Registration
7:00AM–7:45AM	Breakfast (provided)
8:00AM–9:00AM	Plenary - Kevin Rivers - NASA's Langley Research Center
9:00AM–9:30AM	Break
9:15AM–10:05AM	Track Keynote - Cate Brinson - Duke University
9:15AM–11:45AM	Technical Sessions

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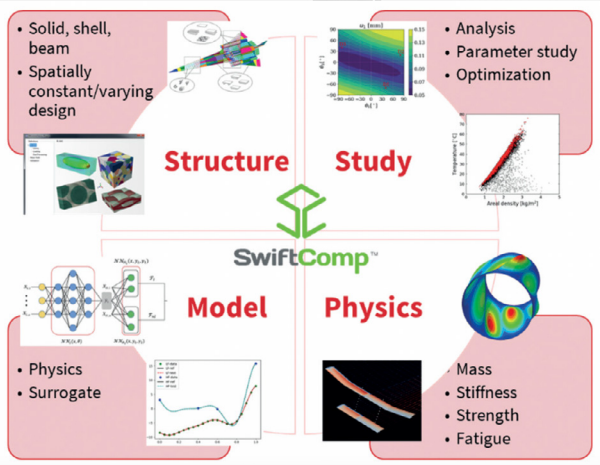
SwiftComp™ is a general-purpose multiscale modeling code that enables users to perform efficient and accurate modeling of composites and other advanced materials (metamaterials, architected materials, porous materials, tailorable composites, etc.). SwiftComp provides efficient high-fidelity constitutive modeling for structural models including solids, plates/shells and beams. It can be used either independently as a tool for virtual testing of composites or as a plugin to power conventional FEA codes with high-fidelity multiscale modeling for composites.



DATC is a new framework centered on SwiftComp developed for the multiscale modeling, analysis, and design of advanced tailorable composites (tow-steered, variable thickness, etc.). DATC can handle multiscale parameterisation, spatially-varying design, and automated hierarchical (de)homogenisation of microstructures. Mechanical performance and coupled multi-physical analyses are available.

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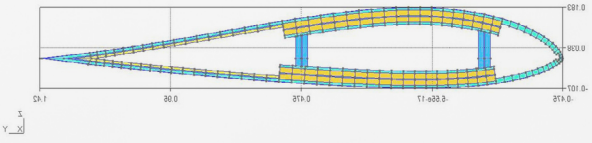
VABS™ is a general-purpose cross-sectional analysis tool for computing beam properties and stress/strains/strengths of slender composite structures. It is a powerful tool for modeling composite helicopter, air mobility/eVTOL, UAV/drone and wind turbine rotor blades, as well as other slender composite structures, such as propellers, landing gear, and high-aspect ratio wings. VABS can calculate ply-level details with the accuracy of 3D FEA in seconds on a typical laptop computer. iVABS, a new VABS-based design framework, enables VABS for design and optimization, parametric studies, uncertainty quantifications, etc., in a user-friendly way.

iVABS™



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SSDM 2025 PLENARY SESSIONS

WELCOME REMARKS
Monday, May 5 | 8:00AM

Erkan Oterkus
SSDM 2025 Conference Chair

PLENARY SESSION
Monday, May 5 | 8:00AM–9:00AM
Presentation Title: Morphing Aircraft Through the Ages

Daniel J. Inmann
Harm Buning Collegiate Professor of Aerospace
University of Michigan

Abstract: Structural shape change, or morphing, was at the root of the emergence of flying machines. An overview of the history of shape changing aircraft from the original Wright Flyer up through to current research into morphing UAVs. The influence of bio inspired flight is discussed and summarized as well as the impact of machine learning concepts. Current research topics and predictions regarding future directions are presented. Specifically, two way-forward suggestions are given: 1) the creation of a new class of structures: autonomous multifunctional structures and 2) what morphing might mean to Urban Air Mobility.

Biography: Daniel J. Inmann, Ph.D., Michigan State University (1980, Ph.D. in Mechanical Engineering; 1975, MAT in Physics; 1970, B.S. in Physics) is the Harm Buning Collegiate Professor and former Chair of the Department of Aerospace Engineering at the University of Michigan. Formerly he was the Director of the Center for Intelligent Material Systems and Structures and the G.R. Goodson Professor in the Department of Mechanical Engineering at Virginia Tech. A former Department Chair of the Department of Mechanical and Aerospace Engineering, State University of New York at Buffalo, he has held adjunct or visiting positions in the Division of Applied Math at Brown University, in Aerospace at the University of Bristol, UK, at Nanjing University of Aeronautics and Astronautics, and in math at the University of Southern California. Since 1980, he has published nine books (on energy harvesting, vibration, control, statics, and dynamics), eight software manuals, 20 book chapters, over 410 journal papers and 674 proceedings papers, given 78 keynote or plenary lectures, graduated 68 Ph.D. students, and supervised more than 75 MS degrees. He is a Fellow of the American Academy of Mechanics (AAM), the American Society of Mechanical Engineers (ASME), the International Institute of Acoustics and Vibration (IIAV), the American Institute of Aeronautics and Astronautics (AIAA), and the National Institute of Aerospace (NIA). He is currently Technical Editor of the Journal of Intelligent Material Systems and Structures (1999–present), Technical Editor of the Shock and Vibration Digest (1998–2001), and Technical Editor of the journal Shock and Vibration (1999–present). He won the ASME Adaptive Structures Award in April 2000, the ASME/AIAA SDM Best Paper Award in April 2001, SPIE Smart Structures and Materials Lifetime Achievement Award in March of 2003, and the 2007 ASME/Boeing Best Paper by the ASME Aerospace Division's Structures and Materials Committee. In September 2007, he received the ASME Den Hartog Award for lifetime achievement in teaching and research in vibration and the 2009 Lifetime Achievement award in Structural Health Monitoring.

PLENARY SESSION

Tuesday, May 6
8:00AM–9:00AM

Grama Bhashyan
CTO for Mechanical Business Unit
Ansys

Biography: Grama Bhashyam is a Fellow of ANSYS Inc. and concurrently holds the role of CTO for Mechanical Business Unit focusing on Solid & Structural Mechanics. He has a doctoral degree and has been deeply involved in commercial nonlinear finite element solution development for over four decades. He advanced from a developer to a leader, authored publications, and led teams in the core computational mechanics areas. He advises and leads selected strategic initiatives in his current role.

PLENARY SESSION

Tuesday, May 6
8:00AM–9:00AM
Presentation Title: Our Wonder Changes the World: NASA Langley's Technology at Work

Kevin Rivers
Associate Center Director for Technical
NASA's Langley Research Center

Biography: Kevin Rivers is the Associate Center Director, Technical, at NASA's Langley Research Center in Hampton, Virginia. In this role, Rivers leads strategy and transformation of the center's technical capabilities to ensure NASA's future mission success. He is particularly focused on accelerating Langley's internal and external collaborations as well as the infusion of digital technologies so the Center can thrive in an ever-more digitally enabled, hyper-connected, fast-paced, and globally competitive world.

Prior to this assignment, Rivers served as Director of the Research Directorate (RD), providing executive leadership to Langley's largest organization. The Research Directorate is made up of over 620 civil service researchers and support personnel, as well as more than 350 on-site contractor employees. As director, Rivers provided focused, technical leadership to NASA programs and projects through conceiving, advocating, proposing, planning, and executing mission-relevant, high-impact research and engineering activities.

Rivers previously served as the Deputy Director of RD at Langley and prior to that, as Deputy Director for Flight Projects Directorate. There, Kevin assisted the center's Director for Flight Projects in leading and managing the development and execution of advanced flight projects to support all NASA Missions including Aeronautics, Human Exploration and Operations, Science, and Space Technology. He was also responsible for long-range project planning and formulation of Project Office objectives, policy, and processes.

Rivers also managed the Launch Abort System Office within the Orion Multi-Purpose Crew Vehicle Program where he was responsible for all aspects of the Launch Abort System development. He successfully led the Launch Abort System team to develop and demonstrate the system through the Pad Abort-1 flight test in May 2010 and through the Exploration Flight Test-1 in December 2014.

During his long career at Langley, Rivers has served as research engineer, project technical lead, branch head, and project manager. In these prior assignments, he led the development of advanced structures technologies for future spacecraft, an on-orbit repair for the Space Shuttle wing-leading-edge, and the integrated vehicle design and analysis for the historic Ares 1-X flight test that flew in November 2009.

He earned a Bachelor of Science in Mechanical Engineering at Mississippi State University and a Master of Science in Aerospace Engineering at Old Dominion University.

SSDM 2025 TRACK KEYNOTES

STRUCTURES KEYNOTE

Monday, May 5
9:15AM–10:15AM
Keynote Title: Modeling Some Hard Problems in Mechanics with the Peridynamic Theory

Stewart Silling
Distinguished Member of the Technical Staff
Sandia National Laboratories
Multiscale Dynamic Material Modeling Department

Abstract: The peridynamic theory was proposed in the year 2000 as a generalization of the standard theory of continuum mechanics. In the peridynamic approach, the fundamental laws are expressed as integro-differential equations, rather than partial differential equations. This permits the nucleation and growth of cracks to be treated on the same basis as other forms of material deformation and failure, without the need for separate laws that govern the discontinuity. The method also allows long-range forces, including those that are important at the nanoscale, to be incorporated in a natural way.

This talk will explain the purpose of the peridynamic theory and how, in numerical form, it can be applied to some challenging applications in aerospace materials and structures. It will be demonstrated that cracks form spontaneously in the model, and then grow and merge to form fragments. Applications include impact events such as bird strike on aircraft and the penetration of composite structures by projectiles. Simulating the erosion of solids by small particles will be demonstrated. Recent progress on the modeling of random media and the simulation of additively manufactured materials will be discussed. The use of machine learning techniques to help determine the continuum properties of complex materials will be demonstrated.

The main advantages and disadvantages of the peridynamic model relative to standard computational models will be discussed, as well as progress on its incorporation into commercial codes.

Biography: Dr. Stewart Silling is currently a Distinguished Member of the Technical Staff, Sandia National Laboratories, Albuquerque, New Mexico. He received B.S. degrees from MIT in Physics and Nuclear Engineering (1977), M.Eng. from UC Berkeley in Nuclear Engineering (1981), and a Ph.D. from Caltech in Applied Mechanics (1986).

His experience includes:

- Staff member at the U.S. Nuclear Regulatory Commission
- Engineer at Science Applications International Corp (SAIC)
- Assistant Professor at Brown University
- Visiting faculty member at Caltech
- Visiting Scholar at The Boeing Company

His current areas of research interest include solid mechanics, computational methods, and fractured fragmentation. He is the recipient of the Belytschko Medal (2015) awarded by United Association for Computational Mechanics (USACM).

STRUCTURAL DYNAMICS KEYNOTE

Tuesday, May 6
9:15AM–10:15AM
Keynote Title: Dynamics of Structures with Uncertain Properties: Challenges and Advances in Stochastic Modelling

Sondipon Adhikari
Professor of Engineering Mechanics
James Watt School of Engineering
The University of Glasgow

Abstract: Uncertainty is an inherent feature of aerospace and structural systems arising from manufacturing variability, environmental conditions, and modelling approximations. Accurately capturing these uncertainties is crucial for the reliability and performance assessment of modern engineering structures. This keynote lecture will explore recent advances in stochastic dynamics and uncertainty quantification, with a focus on non-parametric uncertainty modelling and Random Matrix Theory (RMT).

The equations of motion for uncertain dynamical systems are typically represented by coupled ordinary differential equations with stochastic coefficients, leading to significant computational challenges, particularly in high-dimensional systems with many random variables. Among various numerical techniques, polynomial-chaos-based Galerkin projection methods have emerged as powerful tools, offering higher accuracy than classical perturbation methods and greater efficiency than Monte Carlo simulations. However, their computational cost increases significantly with the number of random variables, and accuracy tends to degrade over long time scales.

To address these challenges, new reduced-order stochastic modelling techniques have been developed, enhancing computational efficiency while maintaining accuracy, particularly in the frequency domain. These approaches leverage projection-based reduced-order methods, modal decomposition techniques, and random matrix theory, enabling the efficient quantification of uncertainty in complex aerospace and structural systems. Practical examples will illustrate applications in vibration analysis, structural health monitoring, and robust design, demonstrating the effectiveness of these techniques in real-world scenarios.

By bridging advanced mathematical modelling with practical engineering applications, this lecture will provide new perspectives on uncertainty quantification in aerospace structures and structural dynamics, offering insights that are both theoretically rigorous and practically impactful.

Biography: Sondipon Adhikari, Ph.D., is a Professor of Engineering Mechanics at the James Watt School of Engineering, University of Glasgow. His contributions to engineering have been recognised with the prestigious Wolfson Research Merit Award from the Royal Society (UK Academy of Sciences), the Philip Leverhulme Prize in Engineering, and an EPSRC Advanced Research Fellowship. Previously, he held the inaugural Chair of Aerospace Engineering at Swansea University, served as a Lecturer in Aerospace Engineering at Bristol University, and was a Junior Research Fellow at Fitzwilliam College, Cambridge. He has been a visiting professor at École Centrale Lyon, Rice University, University of Paris, UT Austin, and IIT Kanpur, and a visiting scientist at Los Alamos National Laboratory. His multidisciplinary research spans uncertainty quantification in dynamic systems, computational mechanics, dynamics of complex systems, inverse problems in linear and nonlinear dynamics, and vibration energy harvesting. He has authored six books and published over 400 international journal papers and 200 conference papers, with a Scopus h-index of 72.

Professor Adhikari is a Fellow of the Royal Aeronautical Society and an Associate Fellow of the American Institute of Aeronautics and Astronautics (AIAA). He serves on the editorial boards of several leading journals, including *Advances in Aircraft and Spacecraft Science, Probabilistic Engineering Mechanics, Computers & Structures*, and the *Journal of Sound and Vibration.*

MATERIALS KEYNOTE

Wednesday, May 7
9:15AM–10:15AM

Cate Brinson
Duke University
Thomas Lord Department of Mechanical Engineering and Materials Science

Biography: Cate Brinson, Ph.D., is the Sharon and Harold Yoh Professor and Donald Alstadt Department Chair of the Mechanical Engineering and Materials Science Department at Duke University. She obtained her Ph.D. from Caltech and was faculty at Northwestern University prior to joining Duke. She is an expert in the broad area of mechanics of materials, with emphasis on complex hierarchical materials and polymer based systems, and merging concepts of data science into materials. Experimental and computational work spans the range of molecular interactions, micromechanics, and macroscale behavior. Current research foci include nanostructured polymers, interfacial behavior, structural metamaterials, and AI and data platforms for material query and design. Her awards include the Eringen Medal of SES, the Nadai Medal of ASME, the Bessel Prize of the Humboldt Foundation, and a Fellow of many professional societies. She served on the SES Board of Directors and is a founding member of the Materials Research Data Alliance (MaRDA).

SSDM 2025 AWARDS

THE SPIRIT OF ST. LOUIS MEDAL

The Spirit of St. Louis Medal is awarded for meritorious service in the advancement of aeronautics and astronautics. The medal was established in 1929 by Philip D. Ball, ASME Members, and Citizens of St. Louis, Missouri.

Recipient: Stephen W. Tsai
Stanford University

DEDICATED SERVICE AWARD

In 1983, the ASME Board of Governors approved the establishment of the ASME Dedicated Service Award (DSA). It honors unusual dedicated voluntary service to the Society marked by outstanding performance, demonstrated effective leadership, and prolonged and committed service, devotion, enthusiasm, and faithfulness. The award may be presented to selected individuals who have served the Society for at least ten years in one or more of the following areas: Standards and Certification; Public Affairs & Outreach; Section Engagement; Technical & Engineering Communities; Student & Early Career Development; Board of Governors; ASME Foundation; and The ASME Auxiliary, Inc.

Recipient: Xin-Lin Gao
Southern Methodist University

Xin-Lin Gao, Ph.D., is currently a tenured full professor of mechanical engineering at Southern Methodist University. He also held tenured or tenure-track faculty positions at University of Texas-Dallas (UTD) for three years, Texas A&M University for seven years, and Michigan Technological University for four years. He received an M.Sc. degree in Engineering Mechanics in May 1997 and a Ph.D. degree in Mechanical Engineering (with a minor in Mathematics) in May 1998, both from the University of Wisconsin-Madison. He was elected an ASME Fellow in December 2010 and has served as the Chair of the Aerospace Division Executive Committee and the Chair of the Structures and Materials Technical Committee of ASME.

Recipient: Wenbin Yu
Purdue University & AnalySwift LLC

Professor Yu is the Milton Clauser Professor of Aeronautics and Astronautics at Purdue University, Chief Technology Officer of AnalySwift LLC, and Director of the Composites Design and Manufacturing HUB. He has exhibited outstanding leadership and dedication to ASME for over two decades. Along with his colleagues, he founded SSDM and has made significant contributions to IMECE as a member of the Congress Steering Committee, Technical Vice Chair, and currently as the Technical Chair. Additionally, he has served as the Chair of the ASME Aerospace Division Executive Committee and the Structures and Materials Committee. He is a Fellow for ASME and ASC and an Associate Fellow for AIAA.

ASME/BOEING STRUCTURES AND MATERIALS AWARD

The ASME Aerospace Division Structures and Materials Technical Committee has reviewed the papers published at the 2024 ASME Aerospace Structures, Structural Dynamics, and Materials Conference. On the basis of originality and significance to the field, the paper titled, “ELECTRICAL CHARACTERIZATION AND ELECTROMAGNETIC INTERFERENCE SHIELDING PROPERTIES OF HYBRID BUCKYPAPER REINFORCED POLYMER MATRIX COMPOSITES” (SSDM2024-121586), has been identified as the winner of the Boeing Structures and Materials Award.

Congratulations to the Authors:

Aditi Chattopadhyay, Arizona State University
Kartik Tripathi, Arizona State University
Madeline Morales, DEVCOM Army Research Laboratory
Mohamed H. Hamza, Arizona State University
Todd C. Henry, DEVCOM Army Research Laboratory
Asha Hall, DEVCOM Army Research Laboratory

JOHN J. MONTGOMERY AWARD FOR DISTINGUISHED INNOVATION IN AEROSPACE

The Montgomery Innovation Award will recognize the outstanding contribution of an individual engineer residing in the international community who has researched, designed, or developed (or any combination thereof) new technologies or equipment for the aerospace industry, i.e., propulsion, aerospace structure/materials, stability, and control, etc. As a professional in industry, each recipient will have significantly contributed to aeronautics and astronautics, and the engineering community at large. Awardees will have demonstrated originality, forward-thinking, and a thirst for innovation. The recipient will have helped to revolutionize the industry and open the door for greater progress in the field.

Recipient: Ramesh K. Agarwal
Professor of Engineering
Washington University in St. Louis

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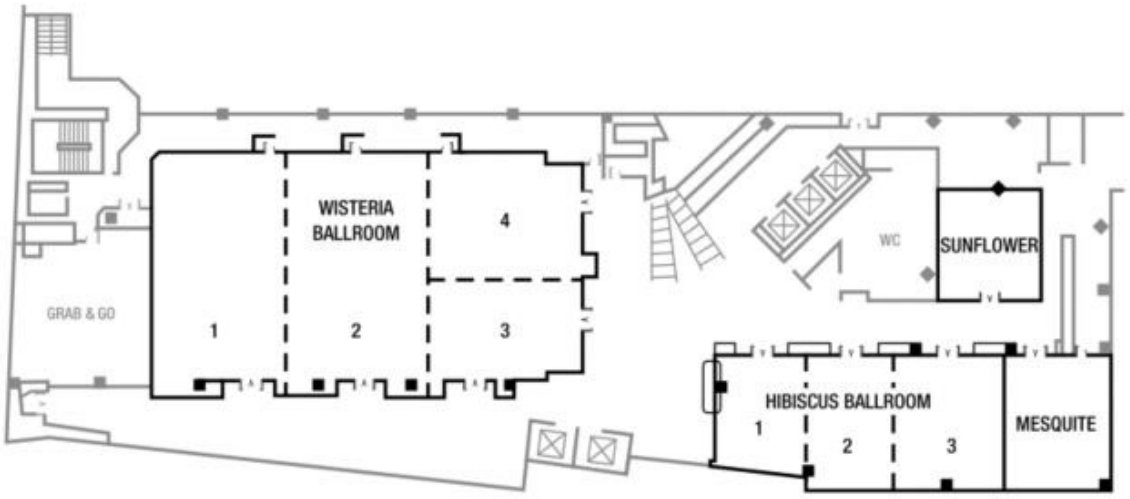

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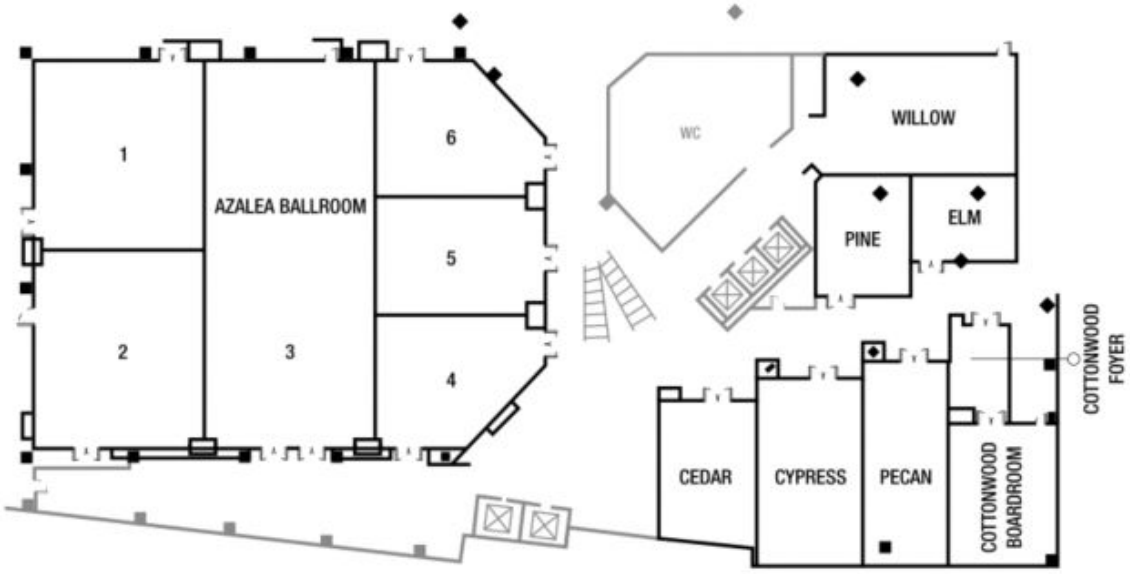

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