Message from the President

Raman Singh, SEM President, 2023-2024

IN THIS ISSUE

THIS PAST YEAR, we held two successful in-person conferences! Our society continues to be financially strong thanks to the staff diligently managing costs and selecting appropriate conference venues. I am especially grateful to all financial decisions made by Jon Rogers and Kristen Zimmerman in collaboration with the executive board in managing the financial health of SEM. The society is well positioned to continue to serve our members today and in the future. In addition, the project to reconcile society databases is proceeding well and will help in better understanding the needs and preferences of SEM members and conference attendees.

Our journals, Experimental Mechanics, Experimental Techniques, and Dynamic Behavior of Materials continue to do well. They serve to provide an active publication platform for our members and conference attendees. The journals also provide a key revenue stream for SEM. I am grateful for all the work that our editors and reviewers provide in attracting high quality publications. In this manner they provide invaluable service to our society. The readership of our journals is highly relevant in all areas of mechanics and I all members and conference attendees to consider them first journals when deciding where to publish your work.

We are looking forward to two robust conferences in 2024. IMAC XLII will be held at the Rosen Plaza Hotel in Orlando, Florida from January 29th to February 1st, 2024. The conferences showcases three pre-conference courses: Introduction to the Python Programming Language for Structural Dynamics Applications; An Introduction to Machine Learning and Data

"While you all reflect over the past year and look forward to 2024, I encourage you to think about your mentors, colleagues, and students who contributed to our society and nominate them for an SEM Award."

Science for Engineers; and Equation- and Data-Driven Nonlinear Model Reduction for Solids, Fluids and Control. The technical program features 84 sessions over the full 4-days. The exhibit hall will have 31 companies demonstrating their products and services. A keynote lecture titled "Technical Examples of Building on the Work of Others to Fulfill Your Purpose" will be presented by Randall Mayes, and the SAGE Publishing Young Engineer Lecture titled "A Case for Using Open-Source Software in Structural Dynamics" will be given by Daniel Rohe, both from Sandia National Laboratories.

The conference will continue to build on success of the Student Ambassadors to increase student engagement in the conference and our society.

Message from the President *continued from page 1*

IMAC XLII will again host hybrid meetings of the SEM Committees (Education, Applications, and Research). Participation information will be posted on the committee websites and on the Whova app for IMAC attendees. Some Technical Divisions that span across structural dynamics and mechanics also plan to have hybrid meetings. Check your TD websites for more information.

A few months after IMAC, we will meet at the 2024 SEM Annual Conference and Exposition on Experimental and Applied Mechanics at the Hilton hotel in Vancouver Washington on June 3rd through 6th, 2024. This is located just north of Portland, Oregon, and about a 15-minute drive from Portland International Airport (PDX). Over 400 abstracts have been submitted. The technical program features a career panel, three symposia and eleven technical tracks. The conference will highlight the 10th anniversary of the Composites Symposium and also features a special symposium to celebrate Prof. Cesar Sciammarella's 100th anniversary and accomplishments.

While you all reflect over the past year and look forward to 2024, I encourage you to think about your mentors, colleagues, and students who contributed to our society and nominate them for an SEM Award. You will find a full list on the AWARDS tab of the SEM website, where you will also find links to nomination forms. Nomination packets are due April 15. Help SEM recognize outstanding contributors through your nomination. Finally, I wish you and yours a safe and happy holiday season and a very happy new year. I look forward to seeing you in Orlando and Vancouver next year.

Raman Singh
SEM President 2023-2024 ∎

SEM President Raman Singh presenting the Presidential Service Award to past SEM President Jim De Clerck at the 2023 SEM Annual Conference in Orlando, FL.

MARK YOUR CALENDARS!

IMAC-XLII

JANUARY 29 – FEBRUARY 1, 2024 | ROSEN PLAZA HOTEL | ORLANDO, FL

Message from the Director

I'D LIKE TO OFFER the SEM community wishes for a happy and healthy holiday season as 2023 comes to a close. It is you, the broader SEM community, that has allowed us to prosper with our conferences, journals and publications, and for that, we are thankful.

Summarizing 2023

Our conferences were financially successful with strong technical programs. IMAC-XLI had more than 550 participants and 400 presentations. While also successful, our 2023 SEM Annual Conference did have lower attendance than previous years with approximately 380 participants and just over 320 presentations.

Our journals continue to flourish under the leadership of the Editors-in-Chief: Alan Zehnder–Experimental Mechanics, Jennifer Jordan–Journal of Dynamic Behavior of Materials and Bonnie Antoun–Experimental Techniques. Their hard work and dedication continue to show through the strides they have made in bringing publication times down and pushing for faster turnaround times in review. As always, each journal could use high-quality submissions from you to ensure continued health in 2024.

Our SEM Series of Handbooks by Springer/ Nature continues with contributions from our Technical Divisions. Several of these have expected release dates in the coming year. If you have ideas and would like to become a contributor/author, please contact me or one of our series editors Eric Brown, Wendy Crone or Kristin Zimmerman.

2024

IMAC-XLII, the 42nd iteration of this conference, will be held January 29–February 1, 2024 in Orlando, Florida. We look to have roughly 350 presentations over the four days of the technical program with three pre-conference courses being offered on Sunday, January 28: Introduction to the Python Programming Language for Structural Dynamics Applications instructed by Dan Rohe; Steve Carter; Brandon Zwink; An Introduction to Machine Learning and Data Science for Engineers instructed by Lawrence Bull; Equation- and Data-Driven Nonlinear Model Reduction for Solids, Fluids and Control instructed by Prof. George Haller; Prof. Shobhit Jain; Dr. Bálint Kaszás. We expect to have more than 30 companies demonstrating their products at the exposition.

Our 2024 SEM Annual Conference will be held June 3–6, 2024 at the Hilton Vancouver Washington in Vancouver, Washington, USA, just over the river from Portland, Oregon. While it's still too early to have good figures, it looks like we can expect approximately 400 presentations.

I am excited to introduce a new feature in Experimentally Speaking… so the broader community may get to know our membership and the work they carry out. With this issue, and going forward, we will be highlighting an SEM member in our Member Spotlight feature. If there is someone you would like to see showcased, please nominate them by emailing me at director@sem.org.

As always, our success is due in large part to the SEM staff and their dedication to ensuring that we can continue to provide the best experience possible to the SEM community. I hope you can join in saying thank you to Shari, Jen, Dan and Nicole for their hard work.

Happy Holidays!

Nuno Lopes, Executive Director ∎

2024 SEM Executive Board Nominees

The SEM Nominating Committee has announced the following updates for the 2024–2025 SEM Executive Board. Biographies for each member appear in this article. Once elected, these members will join current Board members whose terms extend to 2025.

PRESIDENT
Jason Blough

Dr. Blough received his BSME and MSME from Michigan Technological University. Dr. Blough attended the University of Cincinnati to obtain his Ph.D. in structural dynamics. Dr. Blough's Ph.D. was on rotating machinery signal processing methods. Dr. Blough is currently a Professor in the Mechanical Engineering-Engineering Mechanics Department at Michigan Technological University. Dr. Blough has been active in SEM and IMAC for over 20 years publishing papers, serving on the SEM Executive Board, and continues to be an instructor in the "Young Engineers" program at IMAC. Dr. Blough's research is industry funded, with support from the auto and powersports industries, and defense. Dr. Blough has graduated over 40 graduate students and published over 135 papers. Dr. Blough has taught over 40 short courses to industry on various NVH topics.

PRESIDENT-ELECT
Junlan Wang

Junlan Wang is a Professor of Mechanical Engineering and Adjunct Professor of Materials Science and Engineering at the University of Washington. She received her B.S. (1994) and M.S. (1997) in Mechanics and Mechanical Engineering from the University of Science and Technology of China, and Ph.D. (2002) in Theoretical and Applied Mechanics from the University of Illinois at Urbana-Champaign. After a year of postdoctoral research at Brown University, she joined the Mechanical Engineering department of University of California, Riverside in 2003 and moved to University of Washington, Seattle in 2008.

Junlan's research focuses on mechanics of thin films/multilayers, biological and bioinspired materials, high strain rate behavior, and additively manufactured materials. She has received a number of awards and recognitions, including an NSF CAREER Award (2008), SEM Hetenyi (2004), Durelli (2016) and Frocht (2020) Awards, ASEE Beer and Johnston Outstanding New Mechanics Educator award (2007), ASME Certificate of Recognition for Outstanding Services (2015) and ASME Fellow (2020). Within SEM, she has served as Secretary, Vice-Chair and Chair of the Research Committee (2011-2017), organizer of Track 5 (Mechanics of Additive and Advanced Manufacturing) for the 2017 and 2018 SEM Annual, Associate Editor for Experimental Mechanics (2015-present), and the Executive Board (2020-2022). She has also served in multiple leadership roles in the American Society of Mechanical Engineers (ASME), including Chair of ASME Applied Mechanics Division (AMD) Experimental Mechanics Committee (2008-2010) and Materials Division (MD) Multifunctional Materials Committee (2006-2008), Member of the MD Executive Committee (2010-2015; Chair 2014-2015), General Conference Chair of the joint ASME AMD-MD Mechanics and Materials Summer Conference (McMat 2015), and Associate Editor for Journal of Applied Mechanics (2016-2018).

2024 SEM Executive Board Nominees *continued from page 4*

VICE-PRESIDENT
Dr. Sez Atamturktur Russcher

Dr. Sez Atamturktur Russcher returned to Clemson University in July 2023 as Associate Vice President for the Charleston Innovation Centers (located at the CURI Campus in Charleston, SC) and Professor of Mechanical Engineering. She provides leadership in academic matters and scientific research portfolio of the CURI campus and is responsible for staffing, budgeting, and maintaining the facilities and campus operations. In addition, she serves as a liaison between Clemson's Charleston campus and the main campus in Clemson.

Previously, she was the Harry and Arlene Schell Professor and Department Head of Architectural Engineering in the College of Engineering at Pennsylvania State University. As the department head, she served as the chief academic officer of her unit responsible for all matters related to instruction, finance, human-resource, and facilities management. By revitalizing the curriculum and implementing innovative strategies, she led her unit to achieve dramatic increases in student enrollment, engagement and success, notable gains in research productivity, and sharp hikes in philanthropic giving. Prior to joining Penn State, she served at Clemson University as Associate Vice President for Research and Distinguished Professor and founded the Office of Research Development. Previously, Dr. Russcher was at Los Alamos National Laboratory as an LTV technical staff member. Dr. Russcher holds a master's degree in architectural engineering and a doctorate in civil and environmental engineering from Penn State University.

Focused on uncertainty quantification, experimental calibration and validation of predictive models of engineering systems, Dr. Russcher's research has received funding from several federal agencies including the National Science Foundation, the U.S. Department of Energy, the Department of the Interior, the Department of Transportation, the Department of Education, as well as industry organizations and corporate partners. Her work has been documented in over 120 peer-reviewed publications in engineering science journals and proceedings. Among her current professional services, is her role as a member of the board of directors for the National Institute for Building Science, a federally charged entity that reports directly to the President of United States. Dr. Russcher also holds lead advisory roles for the United Nation's High Performance Building initiative, the Vice President of the Society of Experimental Mechanics, and serves as a board member for several academic and research entities worldwide.

Dr. Russcher has a track record of broadening participation in engineering. She has served as the inaugural director of the National Science Foundation-funded ADVANCE project, which focuses on improving the status of women and minority faculty and was the principal investigator and director of the National Science Foundation-funded National Research Traineeship project funding for over 30 doctoral students on scientific computing and data analytics for resilient infrastructure systems. In addition, she has spearheaded federally funded projects on revitalizing undergraduate curricula and on improving transfer student success. In addition, Dr. Russcher was the director of two separate Department of Education-funded Graduate Assistantships in Areas of National Need projects that each provided funding for 10 doctoral students. Dr. Russcher served as one of the four co-directors of Clemson University's Center of Excellence in Next Generation Computing and Creativity.

2024 SEM Executive Board Nominees *continued from page 5*

MEMBER-AT-LARGE
Anders Brandt

Anders Brandt is currently professor and Head of the Department of Mechanical and Production Engineering at Aarhus University in Denmark. He received a MSc degree in electrical engineering from Chalmers University of Technology, Sweden, in 1986, and a Licentiate of Engineering degree in medical electronics from the same university in 1989 with a thesis on bone conduction hearing. For the next 20 years he worked with support, education and consultancy in industry in Sweden and abroad, in the areas of applied signal analysis. In 1996 he co-founded Axiom EduTech, a company dedicated to serve industry and academia with his expertise in advanced signal analysis methods for vibration analysis. During this time, he gave over 250 short-courses on various topics such as frequency analysis, modal analysis, order tracking, and vibration testing. He was also teaching at universities on similar topics.

In 2009, professor Brandt left the company and joined University of Southern Denmark (SDU) as an associate professor, building up a research group focusing on research within operational modal analysis and structural health monitoring. He has supervised and co-supervised 11 PhD students and 31 master students to completion and was promoted to full professor in 2019. He has published over 100 cited papers in the fields of vibration analysis and structural health monitoring. He left SDU to become Head of Department at Aarhus University in 2021.

Professor Brandt is the author of Noise and Vibration Analysis: Signal Analysis and Experimental Procedures, 2nd edition, published by John Wiley and Sons, 2023. In addition, he also published the free ABRAVIBE toolbox for MATLAB and GNU Octave, and maintains the site www.abravibe.com from which the toolbox and other educational material may be downloaded. The toolbox is used throughout universities and industry worldwide and has over 5,000 registered users. He also has a YouTube channel which contains lectures for many of the chapters of his book.

MEMBER-AT-LARGE
Garrison Flynn

Garrison Stevens Flynn completed her Ph.D. at Clemson in 2016 as a U.S. Department of Education GAANN fellow studying propagation of model uncertainties and systematic bias in multi-scale and multi-physics models. She is currently an R&D Engineer at Los Alamos National Laboratory on the Data Analysis Team of the Test Engineering group. Her research interests focus on statistical methods for inverse analysis of complex systems, with applications including nuclear nonproliferation and arms control and treaty verification. Garrison has been an active member of SEM since 2013. She currently serves as Vice-Chair of the Model Validation and Uncertainty Quantification Technical Division. In addition to her research, Garrison is passionate about mentorship. She has served as a mentor to a Girls in STEM program, providing mentorship to seven girls as they progress from 6-12th grade. She was a founding member of an early career development initiative promoting career discovery and collaboration across weapons engineering at LANL. Garrison received her B.S., M.S., and Ph.D. from Clemson University in Civil Engineering with an emphasis in structural engineering.

MEMBER-AT-LARGE
Meredith Silberstein

Meredith Silberstein is an Associate Professor in the Sibley School of Mechanical & Aerospace Engineering at Cornell University and Director of the Engineered Living Materials Institute. She received her PhD in June 2011 from the MIT Department of Mechanical Engineering. Afterward, she served as a postdoctoral fellow at the Beckman Institute at the University of Illinois Urbana-Champaign. She has received the NSF CAREER (2017), DOE CAREER (2018), and DARPA young investigator (2020) awards. Meredith Silberstein's Mechanics for Materials Design Lab is devoted to using mechanical experiments and modeling methods in material design, with particular focus on multifunctional, active, and polymeric materials.

MEMBER-AT-LARGE
Rachael Tighe

Dr Rachael C. Tighe is a Senior Lecturer and Programme Leader of Mechanical Engineering at the University of Waikato, New Zealand. She is a current Royal Society of New Zealand Marsden Fund (Fast Start) recipient. Her work focusses on non-destructive evaluation and full field inspection techniques, particularly thermographic methods, applied to a variety of materials, components and structures for improved damage and defect characterisation.

Rachael obtained her MPhys degree in Physics and MSc degree in Environmental Technology from Lancaster University. She then completed her PhD in Engineering from the University of Southampton. Rachael has worked as a Research Fellow in the Faculty of Engineering at the University of Southampton and for the UK Ministry of Defence before emigrating to New Zealand and the University of Waikato.

Rachael has been a member of the Society of Experimental Mechanics since 2011, and is past Chair of the Thermomechanics and Infrared Imaging Technical Division within the Society. She has previously sat on the British Society for Strain Measurement National Council and the Conference Committee for Manufacturing, Design and Entrepreneurship New Zealand. ∎

IMAC-XLII Pre-Conference Courses

We look forward to seeing you at IMAC-XLII. Enhance your Conference experience by attending one of the following pre-conference courses. Got to www.sem.org/imac to register and make the most of your IMAC experience.

Introduction to the Python Programming Language for Structural Dynamics Applications

Course Description:
Open-Source Tools have become widespread in several scientific disciplines. The free and open-source Python programming language has become a serious competitor to Matlab as a scripting language for performing scientific analyses. There are now several major Structural Dynamics Python packages that are in development or have been released, such as PyFBS, Rattlesnake Vibration Controller, SDynPy, and SDyPy. It is now possible to perform the entire Structural Dynamics workflow using only free and open-source software. Moving Structural Dynamics into open source provides numerous benefits: students can examine code to learn exactly how various algorithms work, researchers can tinker with the code to explore new solutions without having to code everything from scratch, and practitioners can execute their tests or analyses in software that isn't simply a "black box."

This course is designed for current Matlab users (or users with basic proficiency in other programming languages) who are interested in learning Python and how to use some of the Structural Dynamics tools that are available. This course will introduce the basics of the Python programming language with examples motivated by structural dynamics applications. A brief demonstration using Structural Dynamic packages will also be provided. Students are encouraged to attend with their own computers to work along with the tutorials. The instructors will send out instructions for installing the required tools prior to the class, so students can come prepared with the needed software already installed.

Sandia National Laboratories is a multimission laboratory managed and operated by National Technology & Engineering Solutions of Sandia, LLC, a wholly owned subsidiary of Honeywell International Inc., for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA0003525.

Instructors: Dan Rohe, Steve Carter, Brandon Zwink
Date/Time: Sunday, January 28, 2024 | 9:00 a.m. – 6:00 p.m.
Cost: $500/$250 student

An Introduction to Machine Learning and Data Science for Engineers

Course Description:
Machine Learning (ML) and data science are having a huge impact on the way modern engineering is being approached. This is due to three important factors: an exponential increase in available data from in-service systems; significant theoretical developments and new algorithms; several programming frameworks which lower the barrier of entry to these new methods. However, engineering applications still pose unique and challenging use cases for ML tasks. This course will focus on the fundamentals of ML which will allow attendees to make informed decisions about the most appropriate ways to apply this new technology to their problems.

Instructor: Lawrence Bull
Date/Time: Sunday, January 28, 2024 | 9:00 a.m. – 6:00 p.m.
Cost: $500/$250 student

IMAC-XLII Pre-Conference Courses

Equation- and Data-Driven Nonlinear Model Reduction for Solids, Fluids and Control
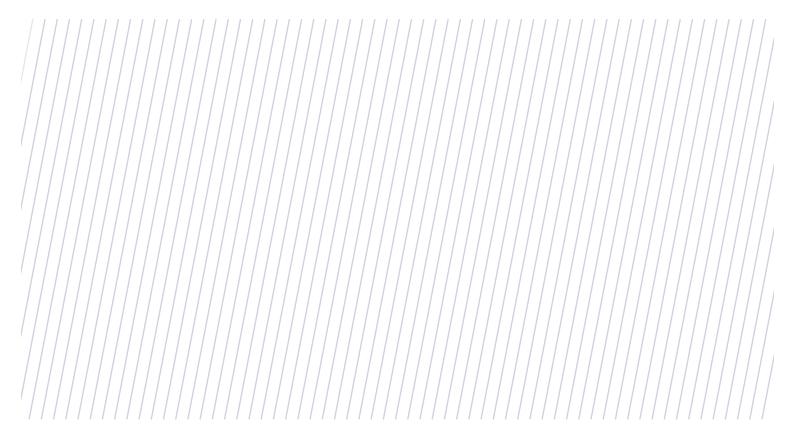
Course Description:
The mechanical systems arising in contemporary science and engineering are growing ever more complex. As a result, the governing equations of these processes are becoming high-dimensional or even unknown. In the latter case, only data-driven modeling is a viable option. For the analysis, prediction, design and control of such equation- or data-defined processes, reduced-order models capturing the core of the underlying physical phenomena are critically important. The most frequently used model reduction methods include modal projection methods, linear approximate models and neural network-based reduction. Each method has its own success stories but also possesses limitations that prevent its general applicability.

Specifically, projection-based models for nonlinear systems are fundamentally heuristic due to their dependence on the linear modes used. Data-driven linear modeling techniques, such as dynamic mode decomposition (DMD) and its variants, are unable to capture characteristically nonlinear phenomena, such as coexisting isolated steady states. Finally, machine learning approaches tend to provide unnecessarily large models that are not interpretable and do not perform well outside their training range.

In this short course, we discuss recently developed, general model reduction techniques that do not suffer from the above shortcomings and provide accurate, low-dimensional reduced models for complex nonlinear systems. This technique is based on the theory of spectral submanifolds (SSMs) that are mathematically rigorous nonlinear continuations of linear modal subspaces in oscillatory systems. We first cover the necessary theoretical background in a format accessible to practitioners and illustrate the strength of SSM-based model reduction on select examples from solid and fluid mechanics.

We then offer a tutorial on practical SSM-reduction for high-dimensional (finite-element-grade) mechanical models via the use of the open source package SSMTool. Finally, we offer a similar tutorial on extracting SSM-reduced nonlinear models from time-varying numerical and experimental data via the open source package SSMTool.

Instructors: Prof. George Haller, Prof. Shobhit Jain, Dr. Bálint Kaszás
Date/Time: Sunday, January 28, 2024 | 9:00 a.m. – 6:00 p.m.
Cost: $500/$250 student ∎

SEM MEMBER SPOTLIGHT

Sharlotte Kramer
Sandia National Laboratories
Member Since 2007

WHY DID YOU JOIN SEM?
I joined SEM to have a professional home where I could grow and support others in their experimental mechanics journeys. SEM is the right size for a professional society to attract a diversity of experts, foster strong connections, and enable members to contribute to the flourishing of the society.

WHAT INTERESTING RESEARCH/PROJECTS ARE YOU CURRENTLY WORKING ON?
I lead multi-disciplinary projects that span experimental and computational mechanics, materials science, and data science. These encompass mechanics of additively manufactured materials across ten orders of magnitude of strain rate, scientific machine learning for material modeling and calibration, Bayesian and machine-learned optimal experimental design for mechanical qualification of structures and novel materials, characterization and modeling of polymeric foams, and mechanics of joints.

BRIEF BACKGROUND
I am a Distinguished Member of the Technical Staff at Sandia National Laboratories. I received my bachelor's degree in Aerospace Engineering from the University of Virginia in 2004 and my master's and Ph.D. degrees in Aeronautics from the California Institute of Technology in 2005 and 2009, respectively. I was a postdoctoral researcher in Materials Science and Engineering at the University of Illinois at Urbana-Champaign before joining the Engineering Science Center at Sandia in 2011. ■

FUN FACT:
I am classically trained mezzo soprano, singing in a semi-professional choir in Albuquerque called Coro Lux. I have sung at Carnegie Hall twice, once as a soloist.

MARK YOUR CALENDARS!

2024 SEM ANNUAL

JUNE 3–6, 2024 | HILTON VANCOUVER WASHINGTON | VANCOUVER, WA (USA)

Upcoming Events

2024

IMAC-XLII | Jan. 29–Feb. 1, 2024
Rosen Plaza Hotel
Orlando, FL USA

2024 SEM Annual Conference | June 3–6, 2024
Hilton Vancouver Washington
Vancouver, WA USA

2025

IMAC-XLIII | Feb. 10–13, 2025
Rosen Plaza Hotel
Orlando, FL USA

2025 SEM Annual Conference | June 2–5, 2025
Hyatt Regency Milwaukee
Milwaukee, WI USA