Experimentally Speaking...

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MESSAGE FROM THE PRESIDENT

Guruswami (Ravi) Ravichandran,
SEM President, 2015-2016

IN THIS Issue

Society for Experimental Mechanics, Inc.
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SEM has a long and rich history in providing a unique forum for exchange and promotion of novel ideas in experimental mechanics. It has earned the reputation as a friendly society providing service to its members and to the society at large. Due to its singular focus on experimental mechanics and its applications, it continues to remain highly relevant to investigation of science and to the development of a multitude of new technologies. Our flagship journal, *Experimental Mechanics*, continues to attract very high quality papers and serves as the leading journal in our field. I welcome Professor Ioannis Chasiotis as the incoming Editor-in-Chief of the journal. I would like to thank the outgoing Editor-in-Chief, Professor Hareesh Tippur for his distinguished service in advancing the journal over the past 5 years. Our newest journal, *Dynamic Behavior of Materials* is off to a great start under the leadership of its Editor-in-Chief, Dr. Eric Brown. SEM's mission and its success is greatly enhanced by our journals.

The advances in experimental mechanics have been greatly enabled by the two major technologies associated with the digital revolution, computers and imaging. Innovations in electronics and MEMS have contributed to the development of new and novel instrumentation for measurements. We should remain at the forefront of developing techniques and instrumentation for experimental mechanics. Our members have been instrumental in developing nearly all the experimental methods ranging from three-dimensional photoelasticity to modal analysis to digital image correlation. Increasingly, three dimensional quantitative visualization techniques becoming commonplace and has been aided by high resolution imaging techniques such as computed tomography (CT), synchrotron X-ray imaging and confocal microscopy. As new applications of experimental mechanics motivated by emergent areas such as energy and biomedicine, our research has become more interdisciplinary drawing expertise from the various sciences. While much progress has been made in measuring displacements (strains) including full-field techniques, very little progress has been in developing direct measurement of forces (stress) and this remains an open challenging problem. A key to the progress and future of experimental mechanics is in the training of future generations, namely our students. We should help our students to attend SEM conferences since they provide a nice venue for the students to meet and listen to colleagues and leaders in the field.

As we enter 2016, I look forward to a successful IMAC Conference, which will be held at the Rosen Plaza Hotel in Orlando, Florida during January 25-28, 2016. The theme for IMAC-XXXIV is "Dynamics of Multiphysical Systems: From Active Materials to Vibroacoustics". Over 500 abstracts have been submitted to the conference. The advance program for the conference is available online at http://sem.org/CONF-IMAC-TOP.asp#Program and there will be four pre-conference courses offered this year.

Experimental mechanics continues to be an exciting field of research and application, which is in large part due to SEM including its conferences and journals. I remain greatly indebted to the society, which has provided inspiration to me for developing new experimental techniques for challenging problems in my research. For SEM to have a bright future, all of us need to be committed to the vision of the founders and support its various activities. I wish you and your family, Happy Holidays.

G. Ravichandran

Guruswami (Ravi) Ravichandran
SEM President

PAUL REYNOLDS APPOINTED THE EDITOR OF EXPERIMENTAL TECHNIQUES

Professor Paul Reynolds has been appointed the Editor of *Experimental Techniques*, effective January 1, 2016.

Professor Reynolds is a Professor of Structural Dynamics and Control in the College of Engineering, Mathematics and Physical Sciences at the University of Exeter, UK. He received his PhD in Structural Dynamics from the University of Sheffield, UK, in 2000.

Professor Reynolds is a founding director of the Vibration Engineering Section. His research interests are in the area of vibration serviceability of civil engineering structures under human excitation as well as those structures supporting highly vibration-sensitive scientific and manufacturing equipment. The focus of his most recent work has been advanced control and isolation technologies for human-induced vibrations in civil structures, which has been supported by a number of grants from the UK Engineering and Physical Sciences Research Council (EPSRC).

Professor Reynolds was awarded a highly prestigious EPSRC Leadership Fellowship entitled "Advanced Technologies for Mitigation of Human-Induced Vibration" which commenced in October 2011. Throughout this 5 year fellowship Professor Reynolds has been focusing his efforts full-time into developing a range of advanced vibration mitigation technologies for human-induced vibration problems. This includes passive, active, semi-active and hybrid technologies suitable for the full spectrum of human-induced vibration problems ranging from single pedestrians on floors through to large crowds on sports stadia and large footbridges.

Professor Reynolds is also a regular consultant to industry in vibration serviceability and related areas and is a founding Director of Full Scale Dynamics Limited, a University spin-off company that was established in 2008. Past commercial work has included dynamic testing and monitoring of a number of UK sports stadia and examining solutions to the London Millennium Bridge problem. A recent major project involved the design, installation and commissioning of the world's first active vibration control system for a concert venue in the USA.

Professor Reynolds has been a member of the SEM for 16 years. He was a member of the Executive Board from 2011-2013 and has been an Associate Editor of *Experimental Techniques* since 2008. He is current Chair of the Applications Committee and has been an Associate Technical Editor of *Experimental Mechanics* since 2011. He has been a recipient of the UK IStructE Yorkshire Branch prize and Sir Arnold Waters Medal. He is a graduate member of the UK Institutions of Civil Engineers and Structural Engineers and a member of SECED, IABSE and SPIE. He is also a member of NAFEMS and a Founding Member of their Professional Simulation Engineer scheme.

Professor Reynolds will succeed Professor Jeffrey Helm of Lafayette College. Under Professor Helm's leadership, *Experimental Techniques* transitioned from a member publication to a peer reviewed Applications Journal. *Experimental Techniques* will transition again starting January 1, 2016 with Springer as the new publisher. SEM thanks Professor Helm for his exemplary service as Editor.

ISEM-SOI 2015 SYMPOSIA

GUANAJUATO, MEXICO, AUGUST 17-21, 2015.

The 5th International Symposium on Experimental Mechanics and the 9th Symposium on Optics in Industry, ISEM-SOI 2015, took place in the peaceful, colonial-era, and historical city of Guanajuato, Mexico, August 17-21, 2015. The events were hosted by the Optical Research Center (Centro de Investigaciones en Óptica), CIO, León, Guanajuato, and were sponsored by a number of organizations, including the Mexican Academy of Optics, SEM, and CIO. Symposia were dedicated as part of the celebrations of the International Year of Light 2015 and the XXXV anniversary of the founding of the CIO. Congratulations! The general topic of the symposia was on the emerging challenges for experimental mechanics in energy and environmental applications.

Participants of the ISEM-SOI 2015 came from around the globe and included 15 countries. There were seven plenary talks given by internationally renowned investigators and a total of 111 papers were accepted through a peer-review process and presented at the Symposia; out of these papers, fourteen were selected as invited.

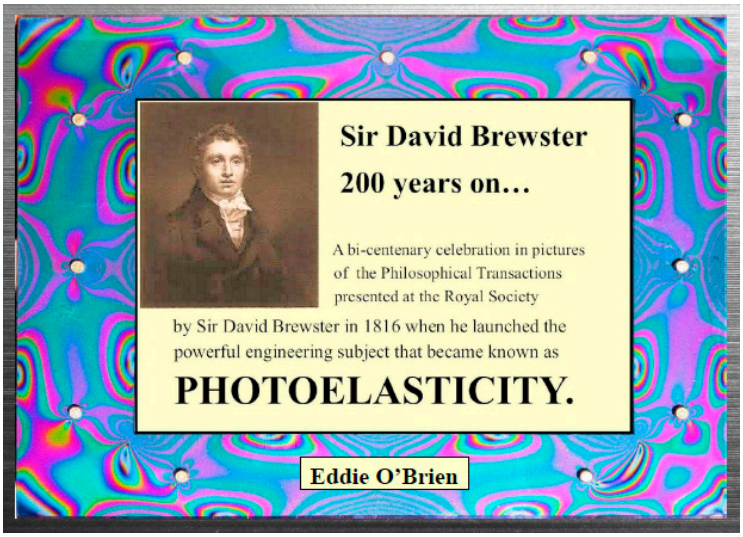
Overall, papers were assigned to relevant tracks that included, dynamic and static structural and substructural testing, non-destructive methods, environmental measuring techniques, multi-scale metrology, and advanced new materials and their characterization.

The venue was the Real de Minas hotel, which is a renovated ex-hacienda decorated in traditional Mexican style and having impressive conference rooms. Hotel is located near downtown Guanajuato, which gave participants the opportunity to travel through underground sets of tunnels to visit such sites as the Alley of the Kiss, the colonial building of the University of Guanajuato, the Basilica of Our Lady of Guanajuato, the Diego Rivera museum, the Juarez Theater, and one of the main sites where the Mexican independence began: the Alhondiga building, now a museum. Guanajuato is surrounded by hills, which gave participants the opportunity to practice some hiking to reach the Pipila monument and enjoy a good view of the city.

Participants were received by traditional mariachi music and also joined in a "callejoneada" in which local musicians, dress up in traditional 17th century costumes, weave their way through the cobblestone streets and narrow alleyways of downtown Guanajuato while playing music, singing popular folk songs, telling stories, and reciting local legends.

Members of the friendly technical society, SEM, made new collaborators and friends in Mexico. The success of the symposia was due to all participants and sponsoring organizations. Proceedings of the symposia will be published by Springer. Co-chairs were: Amalia Martínez-García and Ramón Rodríguez-Vera, CIO, Mexico; Cosme Furlong and Rich Pryputniewicz, WPI, USA.

SIR DAVID BREWSTER 200 YEARS ON...



A bi-centenary tribute to Sir David Brewster – one of the founding fathers of Experimental Mechanics who used physical phenomena to understand materials and structures. He published his work on 'load induced bi-refringence' in his Philosophical Transactions at the Royal Society in January 1816. This was the launch of the ground breaking technique of Photoelasticity. A wide range of photographic results of Photoelastic analyses conducted mainly in the Aircraft Industry at Airbus are compiled to form an artistic and engineering tribute to Brewster's discovery.

The power of the Photoelastic technique developed from Brewster's discoveries in 1816 has proved an ideal tool to meet the requirements of safety and high precision in the Aircraft Industry and other hi-tech industries. This 120-page, full colour book by Dr. Eddie O'Brien–past president of SEM–illustrates the wide range of solutions that are possible to achieve safe and optimized structures.

Photoelasticity has proved to be the starting point in the development of numerous Experimental Mechanics analytical techniques – today the engineer has a selection of tools to ensure quality results thanks to the initiative of Sir David Brewster.

To order a copy, please visit http://www.sem.org/WhatsNew.asp.

SEM WEBSITE UPDATES

The Society for Experimental Mechanics' website will be transforming over the next year to become more appropriate for the growing needs of our membership.

Some of the functions that we will be targeting are a mobile friendly platform with easy searchability, easily updatable Technical Division pages with YouTube video clips, membership updates, etc.

Please check out some of the changes that we have made to date with the look and flow of information on the site. We welcome your feedback. http://sem.org/

EXPERIMENTAL TECHNIQUES—BACK TO BASICS UPDATE

SEM has archived two former *Experimental Techniques* Back to Basics Series. The following Series can be found on the SEM website via the following links.

We are very grateful to our two authors for their tremendous contribution to the SEM.

MODAL SPACE BACK TO BASICS

By Professor Pete Avitabile, University of Massachusetts-Lowell
http://sem.org/PUBS-ArtDownLoad-MSTOC.asp.

OPTICAL METHODS BACK TO BASICS

By Professor Gary Cloud, Michigan State University
http://sem.org/PUBS-ArtDownLoad-OMTOC.asp.

MEMBER NEWS

JIM LALLY

Longtime friend and supporter of SEM/IMAC, Jim Lally, co-founder of Piezotronics, received the Lifetime Achievement Award for contributions to the shock and vibration community at the 86th Shock and Vibration Symposium held October 5-8, 2015 in Orlando, Florida.

Jim and his colleagues at PCB were a driving force in the application and industry adoption of the low impedance 2 wire ICP(R) mode operation of piezoelectric dynamic sensors. The award and short summary of Jim's accomplishments were presented by a former lifetime achievement honoree, Prof Pat Walter of Texas Christian University.

Pictured above, Jim and 3 of his 5 sons (from left-to-right):
Ken Lally CEO of SimuTech Group
Rick Lally, Founder of Oceana Sensor Technologies
Jim Lally, Co-Founder of PCB Piezotronics
Mike Lally, Founder of The Modal Shop

2016 SEM EXECUTIVE BOARD UPDATES

The SEM Nominating Committee has announced the following updates for the 2016–2017 SEM Executive Board. Biographies for each member appear in this article. The newly elected members will join current Board members whose terms extend to 2017.


Peter Avitabile


Kathryn Dannemann


Wendy C. Crone


Sez Atamturktur


Horacio Espinosa


Helena Jin


Randy Mayes

PRESIDENT

PETER AVITABILE

Dr. Peter Avitabile-Professor, Mechanical Engineering, Co-Director, Structural Dynamics and Acoustic Systems Laboratory, B.S.M.E., Manhattan College, M.S.M.E., University of Rhode Island, D.Eng., University of Massachusetts Lowell, Professional Engineer, Rhode Island. Pete has close to 40 years of experience in design and analysis using FEM and experimental techniques. His main area of research is structural dynamics specializing in the areas of modeling, testing and correlation of analytical and experimental models along with advanced applications for developing structural dynamic models. Pete has contributed over 200 technical papers in the area as well as his "Modal Space" article series in the Experimental Techniques magazine published by the Society for Experimental Mechanics. He is the 2004 recipient of the prestigious SEM DeMichele Award. He is recognized worldwide as an expert in structural dynamic modeling applications. He often provides consulting services for a wide variety industries in these specialty areas of expertise.

PRESIDENT-ELECT

KATHRYN DANNEMANN

Kathryn Dannemann is Principal Engineer in the Engineering Dynamics Department at Southwest Research Institute. She is a materials engineer with professional interests and experience in the mechanical behavior of materials, and the interactive effects of microstructure and processing on materials performance. At SwRI, Dr. Dannemann's technical work focuses on the dynamic behavior of various materials (metals, ceramics, composites, glass). She directs technical programs for both government and industry, often implementing customized experimental setups in her programs to aid with understanding mechanical response. She has taught as an adjunct professor in the ME Department at the University of Texas-San Antonio. Prior to joining SwRI in 1996, she worked at the GE Corporate Research and Development Center where she was most recognized for her contributions on the mechanical behavior of materials in extreme (high temperature) environments.

Kathryn received her Ph.D. in Materials Engineering from the Massachusetts Institute of Technology in 1989, and earned B. S. and M. S. degrees in Materials Engineering from Rensselaer Polytechnic Institute. She has made dedicated contributions to SEM since becoming actively involved in 2006. Dr. Dannemann has chaired and organized numerous conference sessions, as well as the Dynamic Behavior of Materials Track for the 2008 and 2009 annual conferences. She served as a Member at Large (2012-2014) of the SEM Executive Board, and is past Chair (2008-2010) of the SEM Dynamic Behavior of Materials Technical Division. Kathryn has served as a Guest Editor for Experimental Mechanics, and will also serve on the Editorial Board of the new SEM journal, Dynamic Behavior of Materials. She has held numerous leadership positions in other technical societies, including ASM International, The Minerals, Metals and Materials Society (TMS), and the Society of Women Engineers (SWE). Dr. Dannemann was recently nominated to the Board of Trustees of ASM International.

VICE-PRESIDENT

WENDY C. CRONE

Wendy C. Crone is a Professor in the Department of Engineering Physics with affiliate appointments in the Departments of Biomedical Engineering and Materials Science and Engineering at the University of Wisconsin–Madison. Her research is in the area of solid mechanics, and many of the topics she has investigated are connected with nanotechnology and biotechnology. She has applied her technical expertise to improving fundamental understanding of mechanical response of materials, enhancing material behavior through surface modification and nanostructuring, exploring the interplay between cells and the mechanics of their surroundings, and developing new material applications and medical devices. In addition to more than 50 peer reviewed journal publications, dozens of explanatory education products, and four patents, she is the author of the book Survive and Thrive: A Guide for Untenured Faculty. Prof. Crone has garnered awards for research, teaching and mentoring, including Fellow (2015) and M.M. Frocht Award (2013) from the Society for Experimental Mechanics (SEM). She has been a member of SEM since 1988 and has served on the Executive Board (2010-2012); National Meetings Council (2010-2012); Vice-Chair, MEMS and Nanotechnology Technical Division (2001-2006); and society representative to the US National Committee on Theoretical & Applied Mechanics, National Academy of Science (2015-2018). She has also served in numerous leadership roles at UW-Madison, including Interim Dean and Associate Dean of the Graduate School (2011-2015).

MEMBERS-AT-LARGE

SEZ ATAMTURKTUR

Dr. Sez Atamturktur, Distinguished Professor of Intelligent Infrastructure at Clemson University, focuses on the development, application and dissemination of model validation and uncertainty quantification techniques. Prior to joining Clemson, Dr. Atamturktur served as an LTV Technical Staff Member at Los Alamos National Laboratory, where she received the LANL Outstanding Contribution Award. Since joining Clemson in 2010, she has graduated nine doctoral students and eleven master students. Along with her research team, Dr. Atamturktur has authored more than seventy peer-reviewed scholarly articles, a number of which have received best paper awards or nominations. At Clemson, Dr. Atamturktur has received funding as principle investigator over $4.7M from U.S. federal and state organizations. She has been invited with full funding to give lectures or seminars at institutions in France, Switzerland, Turkey, China and Germany. Dr. Atamturktur served as chair of the Model Validation and Uncertainty Quantification Technical Division of the Society of Experimental Mechanics and is currently lead guest-editor Elsevier's Mechanical Systems and Signal Processing for a special issue on Decision Analytics for Model Validation. She is the 2014 recipient of the Murray Stokely Outstanding Teacher award as well as the two-time recipient of the Chi Epsilon Outstanding Teacher Award. Dr. Atamturktur received her Ph.D. in civil and environmental engineering from Pennsylvania State University in 2009.

HORACIO ESPINOSA

Horacio D. Espinosa is the James and Nancy Farley Professor of Manufacturing and Entrepreneurship, Director of the Institute for Cellular Engineering Technologies, and Director of the Theoretical and Applied Mechanics Program at the McCormick School of Engineering and Applied Sciences at Northwestern University. He received his Ph.D. in Applied Mechanics from Brown University. Professor Espinosa has made contributions in the areas of dynamic failure of advanced materials, micro, and nanomechanics. He is a foreign member of the *European Academy of Arts and Sciences*, the *Russian Academy of Engineering*, and Fellow of AAAS, AAM, ASME, and SEM. He received numerous awards and honors including the ASME THURSTON award, the Society for Experimental Mechanics LAZAN, HETENYI and SIA NEMAT-NASSER awards. He was the Timoshenko visiting Professor at Stanford University in 2011, President of the Society of Engineering Science in 2012, and currently serves in two committees of the *National Academies*, the U.S. National Committee on Theoretical and Applied Mechanics and the Panel on Materials Science and Engineering to advise the Army Research Lab.

HELENA JIN

Helena Jin is currently a technical staff member at Sandia National Laboratories California. She received her Ph.D. in mechanical engineering from University of Maryland College Park in 2005. Her research is focused on experimental mechanics, especially optical methods for experimental mechanics, micro- and nano-mechanics. Helena has been heavily involved in the society of experimental mechanics (SEM) by organizing tracks and leading the optical methods technical division in the past decade. She has been vice chair and chair of the optical methods division in SEM. She was elected to research committee in June 2015. Helena is also actively involved in other communities such as American Society of Mechanical Engineering (ASME), International Conference on Computational & Experimental Engineering and Sciences (ICCES). Helena has benefited a lot from SEM and she is happy to make contributions and return the favor back to SEM.

RANDY MAYES

Randy Mayes received his MS Mechanical Engineering from Texas Tech. He has worked in the field of structural dynamics for over 30 years at Sandia National Laboratories. He started his career performing finite element analyses, but has spent the majority of his career in experimental structural dynamics, usually for the purpose of finite element model correlation. He has developed experimental algorithms for modal filtering, modal parameter extraction, force reconstruction, sensor placement, nonlinearity detection, linear substructuring, fixed based modal testing, multi-shaker control and mildly nonlinear substructuring. The experimental dynamic substructuring focus group has been his major area of collaboration in recent years.

IMAC-XXXIV COURSES OFFERED

CONFERENCE JANUARY 25–28, 2016 | ROSEN PLAZA HOTEL, ORLANDO, FL

SATURDAY, JANUARY 23, 2016 | 8:00 A.M.–6:00 P.M.

COURSE	INSTRUCTORS
Course 101: Experimental Dynamic Substructuring	Randy Mayes, Matt Allen and Daniel Rixen
Course 102: Operational Modal Analysis: Background, Theory & Practice	Svend Gade and Carlos E. Ventura

SUNDAY, JANUARY 24, 2016 | 8:00 A.M.–6:00 P.M.

COURSE	INSTRUCTORS
Course 103: Teaching, Learning and Performing Vibration Analysis Using the Free ABRAVIBE MATLAB®/ Octave Toolbox	Anders Brandt
Course 104: Theoretical and Experimental Modal Analysis of Nonlinear Mechanical Systems	Alexander Vakakis, Gaetan Kerschen, and Ludovic Renson

To register for IMAC-XXXIV and any of the above courses, please go to http://www.sem.org/CONF-IMAC-TOP.asp.

EVENTS

2016

2016 SEM XIII INTERNATIONAL CONGRESS

AND EXPOSITION ON EXPERIMENTAL AND APPLIED MECHANICS
DYNAMIC BEHAVIOR:
INTEGRATING EXPERIMENTAL MECHANICS

JUNE 6–9, 2016

HILTON ORLANDO LAKE BUENA VISTA @ WALT DISNEY WORLD RESORT
1751 Hotel Plaza Boulevard
Orlando, FL 32830
(407) 827-4000
orlandolakebuenavista.hilton.com

2017

IMAC-XXXV

JANUARY 30–FEBRUARY 2, 2017

HYATT REGENCY ORANGE COUNTY
Garden Grove, CA

2017 SEM ANNUAL

JUNE 12–15, 2017

HYATT REGENCY INDIANAPOLIS
Indianapolis, IN

To explore these events and others SEM and its partners are planning, please go to http://sem.org/Events.asp for more information.