SEM

Experimentally Speaking ...

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President's Message: Diversity in SEM

During the last decade, organizational management studies have shown that diversity is beneficial to organizations. For progressive organizations, diversity is a vital part of their commercial decision-making and strategic planning, and it is on every CEO's priority list. However, for a large number of business owners and organizations, diversity is just about differences in race or gender, and it is not about making the workplace a better place to work.

Diversity is not just about race and gender. It is about providing an environment for a diverse group of people to work and communicate effectively and efficiently; how people learn differently, how they communicate and share ideas, and how they perceive a problem or issue. Diversity helps us identify and deal with the differences we all have. I believe that diversity is really about being open to the global community and being prepared to respond to inquiries and ideas from a diverse community. If one truly understands the diverse culture we all bring to the table, we will have more open communication, better understanding, cultural and economic agreement, and less conflict.

SEM is a great example of diversity. It is an organization of several groups with diverse interests in developing and implementing technology for a variety of uses and applications. And within SEM a great example of diversity is the two major conferences that we have every year. IMAC and the SEM Annual Conference attract what appears to be two very distinct groups with different interests that do not seem to share the same interests, yet there are a significant number of SEM members that attend both events on a regular basis and get the unique opportunity to hear and learn from others that share the same passion for experimental work, but that approach the problems from a different angle using different experimental techniques. During the last few years I have been attending both conferences, and although IMAC is my "home base," I have come to appreciate the amazing work that is usually presented and discussed at the Annual Conference; and my own research has benefitted from these experiences. An added benefit is that I have met some incredible people from which I have learned a lot about experimental techniques, and that have made me realize that "good vibrations" are everywhere. I cannot give you a better example about diversity at SEM than my own personal experience.

Carlos Ventura, SEM President, 2012-2013

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Remembering Past Members

I am sorry to inform you that five of our members, including two of our Past Presidents, Edward Wenk, Jr., and Aldie Johnson, Jr., have passed away this year. Brief details are given below.

Edward Wenk, Jr.

1920–2012

Edward Wenk, Jr. was SESA President 1957-1958. He was the Murray Medalist in 1966. Ed had a multifaceted career as a civil engineer, educator, author, and policy and risk analyst. He began his professional career as an engineering specialist in submarine hull strength design with the U.S. Navy in 1941. He was responsible for being the director of, and on aboard for, the first deep sea dive of each new class of submarines that he designed. He resigned his post with the Navy not long after the launching of the NAUTILUS, the Navy's first nuclear powered submarine.

His next career move was to Southwest Research Institute, San Antonio, TX, to chair their Engineering Mechanics Dept., 1956-1959. While there, he designed a small research submarine, the ALUMINAUT, for Reynolds Metals Co. At the time it was the world's deepest diving true submarine. Although its commercial value was never realized it proved its mettle as a rescue craft for a U. S. Navy research submarine on two occasions.

When a new opportunity beckoned from Washington, D. C., in 1959, Ed accepted a position as Senior Specialist for Science and Technology in the Library of Congress Legislative Reference Service. His primary responsibility was to serve as the first science advisor to the Congress. This was in an era when America's superiority in science and technology was challenged by the Soviet Union's launching of the earth's first artificial satellite, SPUTNIK, and the Congress needed help in researching the possibilities for responding to the implied threat posed by this event.

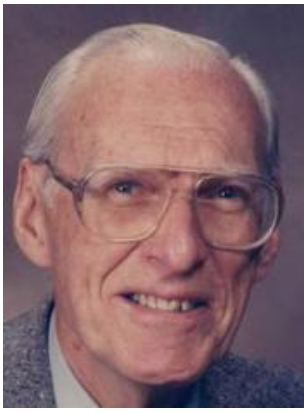
He subsequently played a variety of policy advisory roles on the White House staff in the administrations of Presidents Kennedy, Johnson and Nixon. One role that he particularly enjoyed was that of Executive Secretary of the National Council on Marine Resources and Engineering Development. The Council was charged with representing marine interests throughout the government at the Cabinet level and was chaired by the Vice President. Working with its first chair, Vice President Hubert H. Humphrey, whom Ed greatly admired made it an especially fulfilling assignment.

In 1970, he was appointed at the rank of professor at the University of Washington in Civil Engineering and Public Affairs. His goal was to establish a new program which he hoped would make engineers more aware of the social impacts of their engineering projects. He was the founding director of the new program, the Graduate Program in the Social Management of Technology, and taught courses in it until he retired in 1990 at which time he was granted emeritus status.

He was appointed to the Alaska Commission to investigate the wreck of the Exxon Valdez, 1989, and was a member of the task force to investigate life and property losses caused by Hurricane Katrina, 2005.

Aldie E. Johnson, Jr.

1925–2012



Aldie E. Johnson Jr. was SESA President 1971-1972. He received the Tatnall award in 1977 and was elected a Fellow of SEM in 1977. Aldie was an SEM member for 55 years. He grew up in Davenport Iowa, graduated from Davenport High, joined the Army in 1943, then returned to Iowa and attended Iowa State University in Ames. He met Wilma while at Iowa State and they were married in September of 1947. Aldie graduated in December 1947 with a degree in Aeronautical Engineering and a member of the Delta Upsilon Fraternity.

Together they moved to Newport News, VA to begin work in the Structures Research Division of the precursor to NASA. In 1957, the family moved to Bedford, as he became the Head of the Structures Dept at Avco Rad in Wilmington. In 1968, Aldie moved his focus and work to Teledyne Materials Research (later Teledyne Engineering Services) in Waltham as Vice President of Operations. He was both Treasurer and President of Society of Experimental Stress Analysis (later SEM) during the time at Teledyne. He retired in 1985.

In 1977, Aldie bought a 1931 Model A Mail Truck, which he restored to authenticity and won many medals/awards at various local and National meets. While he was restoring his truck, he was elected Treasurer (1987) and President (1989) of the Model A Ford Club of America (which includes International clubs). While living in Bedford, he was involved in many community activities including: the Bedford Council on Aging Fix-it Shop, Bedford Santa Program, 4-H, as well as being an active Board member of the national Model A Ford Foundation, Minuteman Model A Ford Club, and The Charles River Museum of Industry. Aldie also researched and wrote "The Ford Model A Mail Truck" as well as his own family's genealogy book.

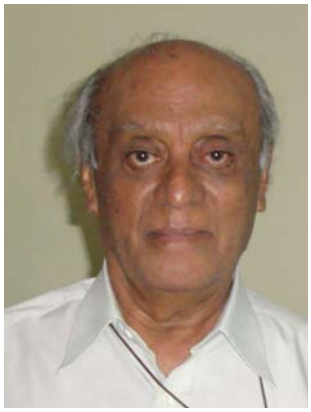
C.W. "Bill" Smith

1926–2012

C.W. "Bill" Smith passed away this summer. It is impossible in this short space to cover all that he accomplished. You can find more detailed information about his career on the Virginia Tech website. I think that Chuck Taylor, longtime friend and colleague of CW said it best: "CW was very prolific in his research and in the writing of papers. He and his late wife, Doris, traveled all around the world attending meetings and making friends. Whenever his American or international friends were in the Blacksburg area, they were routinely invited to stay with the Smiths in their big house in Christiansburg. Through the years they were probably hosts for literally thousands of engineering friends. I consider CW Smith to be the best " good-will ambassador" that SEM has ever had."

Professor L.S. Srinath

1927–2012



Professor L.S. Srinath born in 1927, was a celebrated teacher and an educationist par excellence. He took keen interest in writing books in diverse areas and has written in all 10 books ranging from Linear programming, Operation Research and Experimental stress analysis. His books on PERT and CPM – Principles and Applications and Advanced Mechanics of Solids have become classics with each running into 4 editions and more than 30 reprints!

Professor Srinath is a Fellow of the Indian National Academy of Engineering, Indian Academy of Sciences, Society of Experimental Mechanics, Aeronautical Society of India, Fluid Power Society of India etc. He made major fundamental research contributions in the areas of Experimental Mechanics, Photoelasticity, Photothermoelasticity, Stress wave propagation in solids. Methods developed by Prof. Srinath in the areas of Photoelasticity, Holographic Stress Analysis, and Scattered Light Photoelasticity

One remembrance of Prof. Srinath from Chuck Taylor:

"I knew him when he was a graduate student working under Max Frocht and later was a professor at the Univ. of Kansas. He was the leader in scattered light photoelasticity. His thesis was completed in 1959, before the first laser was invented in 1960 (which increased interest in the method many fold)."

Alexis Lagarde

1929–2012

The University of Poitiers, and the photomechanics group inform you of the death of Professor Alexis Lagarde, occurred on 12 October 2012 at the age of 83 years.

Alexis Lagarde established, in 1965, at the Faculty of sciences of Poitiers, the Laboratory of Solid Mechanics that lead up to December 1985. This laboratory became a research team associated to CNRS (National Center for Scientific Research) in 1970. He was very innovative, more than 45 years ago, to develop methods of experimental mechanics using optical methods. Professor A. Lagarde had the talent to develop, in France, a scientific discipline that is based on the properties of the optical measurements of mechanical quantities.

In 1985, he received the SEM B.J. Lazan Award with the mention "for outstanding original contributions to technology of experimental mechanics through his achievements related to the development of optical methods and techniques for the measurement of stress distributions in two and three dimensional models of significant engineering problems." In 2002, he was distinguished as SEM Fellow.

2013 SEM Executive Board Nominees

The SEM National Nominating Committee has announced nominations for 2013–2014 SEM Executive Board officers. Biographies for each nominee appear in this article.
The Executive Board Nominees are: President–Emmanuel E. Gdoutos; President-Elect–Nancy Sottos; and Vice-President–Guruswami (Ravi) Ravichandran. Executive Board Member nominees are: Eric Brown, Linda Hanagan, Chris Niezrecki, and Robert Rowlands. If elected, they will join current Board members whose terms extend to 2014; Carlos E, Ventura, Peter G. Ifju, Jonathan D. Rogers, Thomas W. Proulx, Alberto Carpinteri, Kathryn Dannemann, James De Clerck, and Charles Van Karsen.

President Emmanuel E. Gdoutos

Dr. Emmanuel E. Gdoutos is Professor and Director of the Laboratory of Applied Mechanics of the Democritus University of Thrace, Greece, and Adjunct Professor at Northwestern University. He is a member of the European Academy of Sciences and Arts, the European Academy of Sciences, Academia Europaea, Russian Academy of Engineering, International Academy of Engineering, Bulgarian Academy of Sciences, and Corresponding Member of the Academy of Athens. He is Fellow of the American Academy of Mechanics (AAM), the American Society of Mechanical Engineers (ASME), the European Structural Integrity Society (ESIS), the International Congress on Fracture (ICF) and honorary member of the Italian Group of Fracture (IGF). He received an honorary Ph.D. from the Russian Academy of Sciences.

Dr. Gdoutos is author of over 250 technical papers and 17 books and editor of 15 books. He served as Editor-in-chief of *Strain* (2007-2010), President of the European Structural Integrity Society (ESIS) (2006-2010), the Greek Group of Fracture (2002-2010), and chairman of the European Association for Experimental Mechanics (EURASEM) (2003-2007). He received the award of merit and the Griffith medal from ESIS, the award of merit from EURASEM, Medal and Diploma of the International Academic Rating of Popularity "Golden Fortune," the Paton Medal of the Jubilee Medal "XV Year to IAE" of the International Academy of Engineering.

He is Fellow of SEM, served on the Executive Board (2006-2008), and received the Lazan, Theocaris, Tatnall and Zandman awards.

Additional Nominations

These individuals are the official choice of the SEM Nominating Committee. The Society's bylaws also provide for alternate nominations. Article IX, Section 4, of the SEM constitution states that, "A member may also be nominated by written petition of at least 75 members of the Society, and submitted to the Secretary, together with the member's consent to serve, if elected, at least 90 days prior to the Annual Business Meeting," (June 2, 2013 in Lombard, IL).

The Bylaws also provide that, if no additional nominations are submitted by the membership at large, the Secretary of the Society (in this case, the Executive Director) shall cast an affirmative vote on behalf of the membership at the Society's Annual Business Meeting.

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http://www.linkedin.com/groups?gid=4581860&mostPopular=&trk=tyah

President-Elect Nancy Sottos

Nancy Sottos is the Donald B. Willet Professor of Engineering in the Department of Materials Science and Engineering at the University of Illinois Urbana-Champaign. She is also a co-chair of the Molecular and Electronic Nanostructures Research Theme at the Beckman Institute. Sottos started her career at Illinois in 1991 after earning a Ph.D. in mechanical engineering from the University of Delaware. Her research group studies the mechanics of complex, heterogeneous materials such as self-healing polymers, advanced composites, and thin film microelectronic devices, specializing in micro and nanoscale characterization of deformation and failure in these material systems. Sottos' research and teaching awards include the ONR Young Investigator Award (1992), Outstanding Engineering Advisor Award (1992, 1998, 1999 and 2002), the R.E. Miller award for Excellence in Teaching (1999), University Scholar (2002), the University of Delaware Presidential Citation for Outstanding Achievement (2002), the Hetényi Award from the Society for Experimental Mechanics (2004), Scientific American's SciAm 50 Award (2008), Fellow of the Society of Engineering Science Fellow (2007), and the M.M. Frocht and B.J. Lazan awards from the Society for Experimental Mechanics. She served as Associate Editor (1999-2002) and as Editor-in-Chief (2003-2006) for *Experimental Mechanics* and currently chairs the International Advisory Board. She has also been a member of the SEM Executive Board (2007-2009).

Vice President Guruswami (Ravi) Ravichandran

Guruswami (Ravi) Ravichandran is the John E. Goode, Jr. Professor of Aerospace and Professor of Mechanical Engineering, and Director of the Graduate Aerospace Laboratories (GALCIT) at the California Institute of Technology. He received his B.E. (Honors) in Mechanical Engineering from the University of Madras, Sc.M. in Engineering and Applied Mathematics, and Ph.D. in Engineering (Solid Mechanics and Structures) from Brown University. After a year of post-doctoral work at Caltech, he joined the faculty of the University of California, San Diego in 1987 and returned to Caltech in 1990 where he has been ever since. He is a Fellow of the SEM and ASME. His awards and honors include, B. J. Lazan and M. Hetényi Awards from SEM and Charles Russ Richards Memorial Award from Pi, Tau, Sigma and ASME. He received Doctor honoris causa (Dhc) from Paul Verlaine University and was awarded Chevalier dans l'ordre des Palmes Académiques by the Republic of France. His research interests are in the area of mechanical behavior of materials with emphasis on dynamic deformation and failure, biomaterials and cell mechanics, and experimental mechanics. He has served as an associate editor of SEM's Journal of Experimental Mechanics and ASME's Journal of Engineering Materials and Technology.

Member-At-Large Eric Brown

Dr. Eric N. Brown manages the Neutron Science and Technology Group of the Physics Division at Los Alamos National Laboratory, which conducts internationally recognized programs in dynamic behavior of materials under extreme conditions, fluid dynamics, nuclear physics, astrophysics, atomic physics, and science-based stockpile stewardship. Eric leads an ongoing research program linking fracture, high strain-rate, and shock behavior to atomic-level material evolution in polymers and composites. He pioneered early work into self-healing materials. Eric has received awards from SEM, ASC, DOE-NNSA, LANL, MRS, TMS and the University of Illinois, including SEM's JSA Young Investigator Lecture and Award (2009). He is presently serving his third term as Associate Technical Editor for Experimental Mechanics. He was guest editor for the EM 50th Volume Review Series (2010) and a Special Issue of EM on the Mechanics of Organic, Implant and Bioinspired Materials (2007). He has served SEM as the current vice-chair of the Research Committee, Chair of Biological Systems and Materials TD (2004-2006), and organizer of several Panels on Junior Career Development in Industry & Research Laboratories. He has organized numerous sessions and tracks on Biomaterials, Composites, and Dynamic Behavior of Materials. He has been strongly involved the Dynamic Behavior of Materials TD since its inception, including co-founding the highly successful symposia on the Dynamic Behavior of Low Impedance Materials. Eric received a B.S. in

Continued

Mechanical Engineering and a Ph.D. in Theoretical and Applied Mechanics, both from the University of Illinois at Urbana-Champaign. Dr. Brown joined LANL as a Director's Postdoctoral Fellow and has since held a number of titles in the Materials Science & Technology Division, the office of the Associate Director for Weapons Physics, and Physics Division, as well as Technical Advisor for the Joint DoD/DOE Munitions Program in the Office of the Secretary of Defense.

Member-At-Large Linda Hanagan

Linda M. Hanagan, PhD, PE, is an Associate Professor of Architectural Engineering at the Pennsylvania State University. She has been on the faculty at Penn State since 1998 and currently serves as the Graduate Program Officer. Her area of teaching specialization is structural engineering with a particular emphasis in the analysis and design of buildings. She is the recipient of the Penn State Engineering Society's Outstanding Teaching Award (2003) and the Premier Teaching Award (2008). Dr. Hanagan's primary research interest is in the vibration serviceability of structures. Her work in this area began in 1991 as a doctoral student at Virginia Polytechnic Institute and State University. After receiving her PhD in 1994, she continued research as a faculty member at the University of Miami and then at Penn State. She received the prestigious AISC Faculty Fellowship award in 2003 to continue her work in floor vibration research. In 2005, Hanagan received a patent for the development of a special purpose device to control excessive walking induced vibrations of lightly damped building floors. With her co-author, Dr. Salyards, she received the Outstanding Paper of 2010 award in recognition for their contribution to the Journal of Performance of Constructed Facilities. She has overseen dozens of research projects, participated in several committees, supervised many students, and written numerous papers that have contributed to the body of knowledge in vibration serviceability.

Member-At-Large Christopher Niezrecki

Christopher Niezrecki is currently a Professor in the Department of Mechanical Engineering at the University of Massachusetts Lowell. He obtained dual BS degrees in mechanical and electrical engineering from the University of Connecticut in 1991. In 1992 he obtained a MS. degree in mechanical engineering from Virginia Tech and his Ph.D. in 1999 while working at the Center for Intelligent Materials Systems and Structures (CIMSS). He was the Director of the Smart Structures and Acoustics Laboratory at the University of Florida until 2004, is currently the Co-Director of the Structural Dynamic and Acoustic Systems Laboratory (http://sdasl.uml.edu/), and leads the Wind Energy Research Group at UML (www.uml.edu/windenergy). Dr. Niezrecki has been directly involved in smart structures and noise and vibration control research for over 20 years, with more than 90 publications. He is the member of three separate conference executive committees pertaining to structural dynamics/smart structures. Areas of current research include: wind turbine blade dynamics, structural dynamic and acoustic systems, smart structures, controls, signal processing, structural health monitoring, bio-acoustics, and smart materials. Funding for his research ($6.1M) has been provided by grants from NSF, DOE, ARO, ARL, ONR, AFRL, DOT, U.S. Army Natick Soldier Center, Motorola, Robert Bosch LLC, Raytheon, Pratt & Whitney, NCIIA, Florida DOT and Florida Fish and Wildlife Conservation Commission. He is a member of ASME, SPIE, SEM, and the Acoustical Society of America.

Member-At-Large Robert Rowlands

R. E. Rowlands received his BASc in ME from the University of British Columbia, Vancouver, Canada and his PhD (1967) in Theoretical and Applied Mechanics, University of Illinois, Urbana, IL. He was affiliated with the IIT Research Institute, Chicago, from 1967 to 1974 when he joined the University of Wisconsin, Madison, where he is a ME professor. Bob has published well over 100 archival technical papers (approx. 30% of them in Jour of Experimental Mechanics), is a Fellow of ASME and SEM, past recipient of the Hetenyi and Frocht Awards of SEM, and served as Clark C. Heritage Visiting Scientist, USDA Forest Products Laboratory. He is a registered professional engineer, has served as Assoc. Tech. Editor and/or sits on advisory boards of several technical journals/societies, presented numerous invited technical lectures, reviewed for over 30 technical/professional journals, organizations/societies or granting agencies, has served on numerous UW-Madison committees, and as an engineering consultant, including expert witness.

Book Review

Experimental Mechanics of Solids
by Cesar A. Sciammarella and Federico M. Sciammarella

pp. i-xxii & 1-743, Wiley, ISBN: 978-0-470-68953-0

The book provides a comprehensive, in-depth and up-to-date presentation of widely used techniques and methodologies of experimental mechanics in the analysis of engineering materials and structures in the macro, micro and nano scale levels. Recent developments of experimental techniques for measuring shape, displacements, strains and stresses using computational methods are presented. It contains the following twenty two chapters:

1. Continuum mechanics - Historical background
2. Theoretical stress analysis - Basic formulation of continuum mechanics. Theory of elasticity
3. Strain gages - Introduction to electrical strain gages
4. Strain gages instrumentation - The Wheatstone bridge
5. Strain gage rosettes: Selection, application and data reduction
6. Optical methods - Introduction
7. Optical methods - Interference and diffraction of light
8. Optical methods - Fourier transform
9. Optical methods - computer vision
10. Optical methods - Discrete Fourier transform
11. Photoelasticity - Introduction
12. Photoelasticity applications
13. Techniques that measure displacements
14. Moiré method. Coherent illumination
15. Shadow moiré & projection moiré - The basic relationships
16. Moiré contouring applications
17. Reflection moiré
18. Speckle patterns and their properties
19. Speckle 2
20. Digital image correlation (DIC)
21. Holographic interferometry
22. Digital and dynamic holography

Each chapter starts with a comprehensive introduction giving an overview and proceeds in a pedagogical and inductive way to present the topics of the chapter. Following two introductory chapters on the basic concepts of continuum mechanics and the theory of elasticity, the book covers the strain gage technique and the optical methods of experimental mechanics of solids. The basic concepts of optics including properties of light, geometrical optics, interference and diffraction of light, continuous optical Fourier transform, computer vision and discrete optical Fourier transform are presented. The optical methods are divided to two categories: those based on the Neumann-Maxwell stress-optical law for the measurement of stresses, like photoelasticity; and those for measurement of displacements, like moiré, speckle methods, and digital image correlation. Holographic interferometry and digital and dynamic holography are presented. Examples of engineering problems of practical importance are provided in each chapter.

The more than half-a-century research, in-depth knowledge, experience and wisdom of the senior author are manifested in each chapter of the book. The distinctive feature of the book is the detailed and thorough blend of optical and digital procedures of the various methods. These methods have tremendously advanced in the last few years through computational techniques. Another distinctive feature is the connection and interrelation of the optical techniques. For example, speckle interferometry is considered as an extension of moiré, in which the surface structure is used as the carrier of information, as opposed to moiré where the grating is engraved or projected on the surface under analysis. White light speckle is related to incoherent light moiré in that it uses random signal to encode the displacement information, while the second uses a deterministic signal. Digital image correlation is related to speckle photography by using artificial speckles and developing a procedure to decode displacement information from the comparison of two patterns recorded and saved in the memory of a computer, one before and another after the body is deformed. Finally, holography records both the amplitude and the phase of a light wave based on the phenomenon of interference of light.

The book is highly recommended as a textbook in courses of experimental mechanics and can be used as a basis on which the researcher, the student and the practitioner can develop their ideas and promote research and applications of the experimental methods in engineering problems. The connection and interrelation of the various optical techniques is astonishing. The book is accompanied by a website containing problems with solutions for each chapter. The authors should be commended for the coherent, inductive, and pedagogical presentation of the various topics. It is a must-have book for every experimentalist. I strongly recommend it.

Emmanuel E. Gdoutos
SEM President-Elect

Experimentally Speaking . . .

President's Message continued from page 1

The SEM "family" is made up of different genders, different age groups, different technical and cultural backgrounds and different thought processes. Yet, its members share a common desire to learn from each other and to be a part of a project or initiative that aims to discover new applications or find solutions to challenging problems. If there was no such desire, SEM would not exist in its present form, and would be operating as a very different organization than what it is today.

Diversity begins at the top, with the leaders of SEM understanding and constantly looking for individuals that work well together, communicate with one another, and fit the culture of the organization. By ensuring that SEM keeps building diversity, we can help to build a stronger organization and provide a broader platform to fulfill our commitment to the interdisciplinary application, research and development, education, and active promotion of experimental methods. We are developing technologies that are contributing to make our world flatter and smaller, and we are achieving this by being a society that is multicultural, not only from the racial point of view, but also from the diversity of our research interests and practical application of the technologies that we are developing.

Since its inception in 1943, SEM has been an organization committed to recognizing, appreciating and retaining the variety of characteristics that make individuals unique by providing an environment that champions both individual and collective achievements. And this is why I have always enjoyed being part of the "Friendly Society" and look forward to enjoying this diversity for many years to come.

In order for SEM to continue its support to the experimentalist's work, we all need to recognize that diversity is what is giving us the various opportunities for the exchange of knowledge in all areas involved with experimental mechanics.

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