Experimentally Speaking...

sem.org

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MESSAGE FROM THE PRESIDENT

Peter Avitabile, SEM President, 2016-2017

IN THIS Issue

Society for Experimental Mechanics, Inc.
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sem.org • 203.790.6373

As we start to move into 2017, SEM can look back at a very successful IMAC conference in February and look forward to a well-organized annual conference in June. The conferences are a very important part of SEM overall along with the journals and publications.

IMAC 35 was a major anniversary for the conference. As I look back at IMAC 1, I remember being a young engineer and thrilled about the opportunity to learn new ideas and techniques and methodologies that could be used to help me solve the engineering problems I faced. I grew up with IMAC and watched it morph and grow in many different ways. What is most amazing to me is that I still see all the same attributes as when I was a young engineer. Yes … I am much, much older now and have had the benefits of decades of exposure to the technology and techniques. And there are still innovations that can be seen in the way technology is deployed in this field. So for myself, I can still re-learn old things all over again with a new twist or a flare on the manner in which it is done with today's technology. But what is most amazing to me is to see the new blood of new, young engineers getting to the conference to see the technology as it exists today. Oddly, the glimmer in their eyes reminds me of my first few IMAC conferences and in many respects I see myself from decades before. And these new participants are not just sitting back and absorbing information, they are becoming actively involved in making the IMAC conference more meaningful to themselves by helping SEM provide what the SEM/IMAC community sees as the needs for the future with focused groups being formed and new directions and ideas bubbling up from their involvement in the conference.

Of course, the Annual Conference is gearing up right now for the 74th meeting from June 12 to June 15, 2017 at the Hyatt Regency Indianapolis. The conference will focus on Challenges in Experimental Mechanics and the conference and sessions will concentrate on this topic. Of course as I look at the webpage, the number of different sessions that have been organized is close to 100! Yes, there are 97 sessions that span the generic categories of Advancement of Optical Methods in Experimental Mechanics, Challenges in Mechanics of Time-Dependent Materials, Dynamic Behavior of Materials, Mechanics of Additive and Advanced Manufacturing, Experimental and Applied Mechanics and Fracture & Fatigue along with the 18th International Symposium on Micro- and Nanomechanics, the 3rd International Symposium on the

Continued

Mechanics of Composite and Multifunctional Materials, and the 7th International Symposium on the Mechanics of Biological Systems and Materials. In addition, there will be several pre-conference courses that will help round out the entire program. Clearly, there is a very broad and deep set of sessions and topics that will be covered at the conference.

In the last newsletter, I pointed out how well the journal and publication part of the society has done. The Experimental Mechanics Journal (Ioannis Chasiotis), the Journal of Dynamic Behavior of Materials (Eric Brown) and Experimental Techniques (Paul Reynolds) have all been doing very well in the quest to provide meaningful, relevant and timely publications for the society. Their efforts are the "labor of love" and we all need to recognize the tremendous amount of time needed to support these critical publications for the society. Thank you for your efforts.

As we move forward, SEM is growing and changing as we start to re-organize and modify how we do business today. The new webpage is the main attraction to the society overall. The new webpage is still under much change and all of the members will see dramatic improvements as we continue to tweak and tune the interface. Yes, there are things that need work and there are some glitches along the way. But with any significant change, we will need to morph and modify to provide all that we need as we move forward. But I ask all the members to be patient as we fine tune the system. And recognize that we have a very dedicated collection of people in the office that are all trying the best they can to provide all the support and requests from our members. Each of these people has a very strong commitment to provide the very best support they can. But please recognize that they are all working with extreme diligence to help make the webpage better to provide the level of support that they would like to give to all the members too. They do want to help to make everything as smooth as possible as the webpage progresses and updates and changes are implemented. Please be patient … this will take some more time to get the system to where it will appear seamless. And please send us your suggestions, concerns, and frustrations, so that we can make sure that the system will provide all that you need as part of the SEM family.

SEM has provided a home to our members … one that we all recognize to be a very open society and a very friendly society. As I roamed around the Annual Conference last year and again at IMAC this year, I had many people, who were new to the society, mention to me how welcome they all felt as they entered into our world. We have been very successful as a result of our friendly attitude and I hope that this remains a consistent theme for SEM. I have certainly felt welcome into the society and this must remain as a focal point as we move forward. SEM is growing and we rely on our members, both seasoned and new to our society, to help us continue to be vibrant and relevant to our core mission. As president, I intend to help keep that focus clear and on the fore-front as we move to make the society better and better. If you have any ideas, thoughts or issues of concern, please reach out and let us know.

Sincerely,

Peter Avitabile
SEM President

FROM THE EXECUTIVE DIRECTOR

With this message, I would like to highlight the outcomes from our recent IMAC XXXV conference and share with you a few areas where we are growing well and areas where we could use additional support from the membership.

Our conferences are key to the success of SEM. Both of our IMAC and Annual Conferences continue on pace bringing in 500+ attendees that are participating by presenting papers, sharing ideas, exhibiting state of the art equipment, and preparing their presentations for publication in one of SEM's three peer-reviewed journals. Our Conference Proceedings produce ten volumes per conference and the number of downloadable abstracts available via our website continues to grow. We are clearly doing some things right in terms of our conferences and we want to continue to enable emerging Technical Divisions (TDs) to blossom and grow, while pruning back those emergent TDs that are no longer as relevant as they used to be. To this point, there are two IMAC focus groups that are ready to emerge as formal Technical Divisions. They are, Nonlinear Systems chaired by our 2017 SAGE Publishing Young Engineer Lecturer, Gaetan Kerschen and Substructuring co-chaired by Randy Mayes and Daniel Rixen.

The tireless work done by our Technical Program organizers, TD Chairs, Track Chairs, and Session Chairs, coordinated by our SEM team, is responsible for creating outstanding programs that continue to bring in large numbers of conference attendees. We, however, need to stay agile and very aware of the emerging areas that we must not only include in our programs, but nurture and grow to potentially become a new focus group or technical division. Our Conference success rests in large part on the success of the Technical Program.

SEM is defined by its ability to remain agile, focused and open to all experimental mechanicians who have an insatiable thirst to learn and grow as experts in their field of study. Our relatively small conference size enables our agility…allowing us to keep our finger on the pulse of what is next, create a conference track to represent an emerging area of interest, and carve out our niche in that new area. A niche that sends the message to our meeting participants that SEM's IMAC, Annual and Fall conferences are the ones to attend. This, I believe is one of the keys to what defines us and gives strength to the meaning of the "friendly society."

On the issue of a Fall conference, SEM is in the midst of reviewing a proposal for a standing Fall Digital Imaging Conference. There will be much more discussion and items to report after our Annual Conference in June.

Publication is another area of growth for the Society with our three journals, Experimental Mechanics, Experimental Techniques and the Journal of Dynamic Behavior of Materials. In addition to these publications, SEM publishes Proceedings for each of its conferences and all are published by Springer/Nature. This means that our meeting attendees and members have a streamlined means for publishing their work in one of three SEM peer-reviewed journals even if the work presented at the conference was published in the Conference Proceedings. Again, archiving, and publishing the work of our conference attendees and our members is core to accomplishing our mission as a Society.

We are also working on the completion of the SEM Handbook of Structural Mechanics. We have Pete Avitabile and Randy Allemang to thank, as well as the many contributors to what I know will be an outstanding publication for the Society.

Where do we need your help? We need to listen to and grow our membership, which has stabilized in growth for the past few years. SEM conferences bring in over 500 participants, but many do not 'sign up' to become a member of the Society. What this means to me is that we need to understand why and learn if there are things we can do better, as a Society, to enhance the 'joining' part of the conference experience/membership equation.

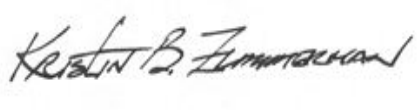
I would like to announce that SEM has hired an new communications manager, Kathy Miller, to assist in communication to the membership. Kathy brings a breadth of experience in working with and designing web platforms as well as experience with the Society of Plastics Engineers. Kathy is a wonderful asset to SEM as we define our communications strategy going forward.

Our new web platform is still in the beta phase so I ask that you please continue to be patient with us as we learn how to design in new interfaces, processes, and ease of use for you, the users of the site. We want your input, your guidance, your patience and your support to be sure it is your 'go-to' website for all things regarding SEM and the mechanics community.

I look forward to your questions or comments so please don't hesitate to email or call.

To those of you that attended IMAC, I want to personally thank you for a successful conference. And I look forward to seeing you in Orlando, Florida in 2018. We guarantee an exciting meeting as we celebrate IMAC 36.

To those planning on attending the Annual Conference in Indianapolis in June - I look forward to seeing you, engaging with you and I invite you as you register for the conference to either renew your membership, or become a new member of SEM!



Kristin Zimmerman,
Executive Director

2017 SEM ANNUAL COURSES

COURSE 101: THE GRID METHOD FOR IN-PLANE DISPLACEMENT AND STRAIN MEASUREMENT: PRINCIPLE, METROLOGICAL PERFORMANCE AND EXAMPLES

SUNDAY, JUNE 11, 2017 | 9:00 A.M.–5:00 P.M.

INSTRUCTOR(S): Michel Grédiac

The grid method is a technique suitable for in-plane displacement and strain measurement. It relies on a regular marking of the surface under investigation. The regular pattern acts as a spatial carrier, and the sought displacement components induce phase modulations of this carrier. Images of this regular marking, which progressively deforms during a test, can be advantageously processed with a spectral method. With the windowed Fourier transform, it is shown that displacement and strain components are obtained quasi-directly, which allows a fast and pixelwise determination of the displacement and strain fields.

This course aims at providing the principle of this technique, with a special emphasis on its theoretical foundation and metrological performance. Practical aspects concerning its implementation will also be discussed.

COURSE 102: DYNAMIC BEHAVIOR OF BRITTLE MATERIALS: EXPERIMENTAL APPROACHES AND MODELING

SUNDAY, JUNE 11, 2017 | 9:00 A.M.–5:00 P.M.

INSTRUCTOR(S): Pascal Forquin

Brittle materials such as ceramics, rocks, glass and concrete, are widely used in many civil and military applications involving dynamic loading, impulse loading, shock or impact: "Explosive compaction of powders", "blasting of rocks", "seismological studies", "ballistic impact against ceramic armor or transparent windshield", "plastic explosive against concrete structures"... In most of these applications, the brittle material is subjected to intense loading characterized by high or very high strain-rates (hundreds to several tens of thousands 1/s), high pressure (hundreds to thousands of MPa) leading to extreme and specific damage modes such as multiple fragmentation, dynamic cracking, pore collapse, shearing and mode II fracturing or microplasticity mechanisms etc.

Additionally, brittle materials present complex and fascinating features that justify greater efforts to develop research works. Indeed, they are characterized by random failure stresses under static tension or unconfined compression loadings. At low strain-rates they are sensitive to size effects, the larger the sample the lower its mean strength. Above a transition strain-rate, the tensile strength of brittle materials increases with the strain-rate and the behavior of brittle materials is no longer-random and becomes deterministic. Furthermore, brittle materials are strongly sensitive to confining pressure, their behavior being more and more ductile with the increase of pressure level.

This course aims at describing the principle and data processing of popular experimental techniques (Hopkinson pressure bar testing, impact experiments) used to investigate the behavior of brittle materials at high-loading rates as well as their limitations and drawbacks. Basis and predictive capabilities of several plasticity and damage models are also underlined. A particular attention is devoted to the relationship between microstructural parameters and the dynamic response of brittle materials.

COURSE 103: KOLSKY BAR (SHPB)

SUNDAY, JUNE 11, 2017 | 1–5:00 P.M.

INSTRUCTOR(S): Weinong Wayne Chen

Kolsky bar, also known as split Hopkinson pressure bar (SHPB), has been widely used as a tool for mechanical characterization of materials deforming at intermediate to high strain rates. Unlike standardized quasi-static testing techniques, Kolsky bars have relatively low stiffness and do not have feed-back control systems to ensure testing conditions on the specimen. Thus, the design of Kolsky bar experiments depends not only on the desired testing conditions but also on the response of the specimen material under investigation. This tutorial introduces methods to produce high-rate experimental results under desired testing conditions.

Offered at no additional charge for paid conference attendees.

Detailed course information can be found on our website at sem.org/annual-conference/

SEM MEMBERSHIP

Society for Experimental Mechanics, Inc.

MEMBERSHIP

- Present and publish your latest research by attending our conferences
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- Join to find many more benefits to SEM membership

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Experimental Mechanics
Experimental Techniques
Journal of Dynamic Behavior of Materials
18 other Springer Journals

Regular Member ($100)

Grad Student Member ($40)

Student Member ($25)

Lifetime Member ($1,500)

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	EDUCATIONAL/ NON PROFIT	GOVERNMENT/ MILITARY	COMMERCIAL	SUSTAINING
Number of Individual Memberships	2	3	4	7
Discount on SEM/IMAC Exposition Rates			10%	15%
Annual Cost of Membership	$600	$900	$1,200	$2,100
Recognition as a Benefactor in SEM Promotional Material	☑	☑	☑	☑
Company Listing on our Website with a Link to your Website	☑	☑	☑	☑

sem.org

ARE YOU MAKING THE MOST OF YOUR SEM MEMBERSHIP?

KEEP UP WITH YOUR READING

Enjoy free access to the Society's three journals, *Experimental Mechanics*, *Experimental Techniques* and *Dynamic Behavior of Materials*. This also emcompasses 15 other topically relevant journals.

SAVE

Individual members attending SEM conferences save on the price of registration in addition to pre-registration savings.
Get member pricing on books published by SEM or discounts on books published by SEM partner publishers.
Are you a member of multiple organizations? SEM offers additional savings for those interested in ASME or BSSM.

INTERACT AND SHARE

Interact with scientists from around the world who are working in the many areas of interest covered by the broad umbrella of Experimental Mechanics. While international in scope, SEM is small enough to provide a forum for easy communication between members. For many members, SEM conferences offer a singular opportunity to discuss their work with other experimentalists in their area of interest. Such interactions are facilitated by the Technical Divisions of the Society.

SEM's Technical Divisions and Focus groups offer individual members the opportunity to narrow in on a specific subject. These groups make it easy to discuss the latest topics during their meetings at our conferences.

As we grow our web platform and social media spaces, look for more opportunities to use services like LinkedIn, Facebook and YouTube as launchpads for discussion among peers.

SHARE

Do you have a job posting, opening or internship you'd like to spread to the broader SEM community?
Our home page will be featuring regularly updated content targeted to our member's interests. If you have something you'd like to share, be it a job posting, an event or relevant news, simply send an email to director@sem1.com with details.

FEEDBACK

We strive to be the "friendly society" and to fulfill our mission. Help us meet our goals and let us know if we're doing a good job, if there's something you'd like to see or if you think we should be doing something differently.

2017 IMAC-XXXV

CONFERENCE AND EXPOSITION ON STRUCTURAL DYNAMICS

STRUCTURAL DYNAMICS CHALLENGES IN NEXT GENERATION AEROSPACE SYSTEMS

JANUARY 3–5, 2017 AT THE HYATT REGENCY ORANGE COUNTY, GARDEN GROVE, CALIFORNIA USA

IMAC Conference Director, Al Wicks, along with SEM President, Peter Avitabile, conducted the Awards Luncheon ceremony, presenting various awards in recognition of outstanding achievements in structural dynamics and service to SEM/IMAC.

Our sincerest congratulations to all those who received awards and to the attendees for making this a successful IMAC conference.

With a theme of *Structural Dynamics Challenges in Next Generation Aerospace Systems*, the conference attracted over 500 attendees and more than 40 exhibitors.

Al Wicks–IMAC Conference Director with Adam Steltzner–keynote speaker from NASA/ Caltech Jet Propulsion Laboratory and Peter Avitabile–SEM President

Peter Avitabile–SEM President with Gaëtan Kerschen–SAGE Publishing Young Engineers Lecturer from University of Liège and Louisa Strain–SAGE

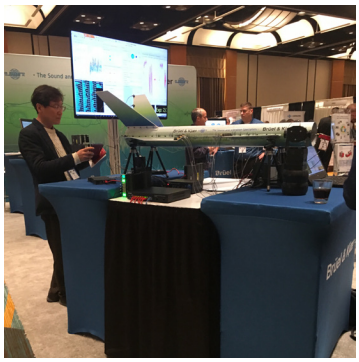
Al Wicks–IMAC Conference Director with D.J. DeMichele Awardee–Mark I. Schiefer and Peter Avitabile–SEM President

Al Wicks–IMAC Conference Director with G.A. Brewer Awardee–Charles Farrar and Peter Avitabile–SEM President

Al Wicks–IMAC Conference Director with D.J. DeMichele Scholarship Awardee–Mathieu Wernsen and Peter Avitabile–SEM President

IMAC-XXXIV PEOPLE AND EVENTS

Attendees mingling and interacting with exhibitors during receptions and show hours.
All photographs courtesy of Shari Matthews and Chad Walber.



IMAC-XXXV

2017

500+ Number of attendees at IMAC-XXXV.

UPCOMING EVENTS

2017

2017 SEM ANNUAL
CHALLENGES IN EXPERIMENTAL MECHANICS
JUNE 12–15, 2017
HYATT REGENCY INDIANAPOLIS
One South Capitol Avenue
Indianapolis, Indiana, USA
(317) 632-1234
sem.org

ICF 14
14TH INTERNATIONAL CONGRESS ON FRACTURE
JUNE 18-23, 2017
RODOS PALACE HOTEL
Trianton
Rodos 851 01, Greece
+30 2241 025222
www.icf14.org

BSSM
12TH INTERNATIONAL CONFERENCE ON
ADVANCES IN EXPERIMENTAL MECHANICS
AUGUST 29–31, 2017
UNIVERSITY OF SHEFFIELD
Western Bank
Sheffield, S10 2TN, United Kingdom
www.bssm.org/conf2017

RESIDUAL STRESS SUMMIT 2017
OCTOBER 23-26, 2017
UNIVERSITY OF DAYTON RESEARCH INSTITUTE
300 College Park
Dayton, OH, USA
(937) 229-2113
www.rssummit.org

ISEM'17
12TH INTERNATIONAL SYMPOSIUM ON ADVANCED SCIENCE
AND TECHNOLOGY IN EXPERIMENTAL MECHANICS
NOVEMBER 1–4, 2017
KANAZAWA THEATRE "KANAZAWA KAGEKIZA"
Kanazawa City,
Ishikawa Prefecture 920-0993 Japan
www.jsem.jp/ISEM12/

2018

IMAC-XXXVI
ENGINEERING EXTREMES: UNIFYING CONCEPTS IN
SHOCK, VIBRATION, AND NONLINEAR MECHANICS
FEBRUARY 12–15, 2018
ROSEN PLAZA HOTEL
9700 International Drive,
Orlando, FL, USA
sem.org

2018 SEM ANNUAL
JUNE 4–7, 2018
HYATT REGENCY GREENVILLE
Greenville, SC, USA

U.S. NATIONAL CONGRESS OF THEORETICAL AND APPLIED MECHANICS
JUNE 5–9, 2018
CHICAGO, IL
http://sites.northwestern.edu/usnctam2018/
(Please note that these dates are in direct conflict with
SEM's Annual Conference and 75th Anniversary.)

2019

IMAC-XXXVII
JANUARY 28–31, 2019
ROSEN PLAZA HOTEL
9700 International Drive,
Orlando, FL, USA
sem.org

2019 SEM ANNUAL
JUNE 3–6, 2019
PEPPERMILL RESORT SPA CASINO
Reno, NV, USA
sem.org

To explore these events and those SEM partners are planning, please go to sem.org.