

CALL FOR PAPERS

2011 SEM Annual Conference and Exposition on Experimental and Applied Mechanics

*Experimental Mechanics in the Age of
Modeling and Simulation*

Mohegan Sun • Uncasville, CT USA

June 13-15, 2011



Track 1: **DYNAMIC BEHAVIOR OF MATERIALS**

Sponsored by: SEM Dynamic Behavior of Materials Technical Division

Organized by: Vijay Chalivendra, *University of Massachusetts
Dartmouth*; Bo Song, *Sandia National Laboratories*;
Daniel Casem, *U.S. Army Research Laboratory*

A growing number of military, industrial, and academic engineering problems are addressing the response of materials that have been subjected to dynamic loading. SEM continues to support this growing research area and is sponsoring this track to provide a forum for the open exchange of information among researchers interested in the dynamic behavior and response of materials. Technical contributions in the following general areas are sought:

- Dynamic Behavior of Composites
- Dynamic Failure of Materials
- Dynamic Response of Structural Steels & Sheet Materials
- Dynamic Response of Transparent Materials
- Imaging at High Strain Rates
- Low Impedance Materials – Gels
- Low Impedance Materials – Geomaterials
- Novel Testing Techniques
- Simulation & Modeling of Dynamic Response & Failure
- Thermal Methods at High Strain Rates

Track 2: **THERMOMECHANICS AND INFRA-RED IMAGING**

Sponsored by: SEM Thermomechanics and Infra-Red Imaging
Technical Division

Organized by: Janice Dulieu-Barton, *University of Southampton*;
Fabrice Pierron, *Arts et Métiers ParisTech*;
Rachel Tomlinson, *University of Sheffield*;
David Backman, *National Research Council, Canada*

This track marks the launch of the SEM Thermomechanics and Infra-Red Imaging Technical Division. In recent years the applications of infra-red imaging techniques to the mechanics of materials and structures has grown considerably. The expansion is marked by the increased spatial and temporal resolution of the infra-red detectors, faster processing times and much greater temperature resolution. The improved sensitivity and more reliable temperature calibrations of the devices have meant that more accurate data can be obtained than were previously available. The purpose of the track is to bring together novel work on all aspects of thermomechanics with focus on the application of infra-red imaging approaches. The main thrust of the session will be on the analysis of thermomechanical behavior of materials and using this behavior to elicit information on material characteristics, stresses and failure. Of particular interest are strong thermomechanical couplings that result in nonlinear behavior such as viscoelasticity, diffusivity and material phase changes. An objective is to share experience on how data-rich experimental mechanics can help scientists and engineers to better understand and simulate the behavior of materials and structures. It is also envisaged that papers utilizing other imaging techniques in conjunction with infra-red approaches will be a key part of the track program enabling cross-fertilization over disciplines and applications. Papers are invited on the following list of non-exclusive track topics:

- Biological Materials
- Composite Structures and Materials
- Composites
- Damage Assessments
- Fracture Mechanics and Failure Assessments
- High Strain Rate/Dynamics Assessments
- Inhomogeneous Materials
- Material Characterizations
- Microscale/Small Scale Testing
- Model Identification/Inverse Techniques
- Nonlinear Materials
- Plasticity
- Residual Stresses
- Soft Materials
- Stress Analysis

2011 SEM Exposition

Reserve your booth space now!

A comprehensive Exposition of testing and analysis equipment will be a highlight of the 2011 SEM Annual Conference. Please contact Joni Normandin to reserve your booth today:

(860) 484-4387 • joninormandin007@aol.com.

SEM Annual International Student Paper Competition

Sponsored by Correlated Solutions, Inc.

SEM will hold its 20th International Student Paper Competition at the 2011 Annual Conference. Participation in the Competition is open to all graduate and undergraduate students, worldwide. Watch for the Competition announcement on the 2011 Conference page of the SEM Web site: <http://sem.org/CONF-AC-TOP.asp>

Track and Symposia descriptions continue on next page

Abstracts Due: October 18, 2010

Track 3: CHALLENGES IN MECHANICS OF TIME-DEPENDENT MATERIALS AND PROCESSES IN CONVENTIONAL AND MULTIFUNCTIONAL MATERIALS

Sponsored by: SEM Time Dependent Materials and Composite Materials Technical Divisions

Organized by: Richard B. Hall, *Air Force Research Laboratory*; H. Jerry Qi, *University of Colorado*; Peter Ifju, *University of Florida*; Gyaneshwar P. Tandon, *University of Dayton Research Institute*; Bonnie R. Antoun, *Sandia National Laboratories*; Hongbing Lu, *University of Texas-Dallas*; Y. Charles Lu, *University of Kentucky*

With weight and volume considerations driving most military as well as commercial aeronautical system developments, there is recent emphasis on the possibilities of performing multiple functions within a material system. Multifunctional material systems also hold promise to enable improved performance and perhaps cost benefits relative to larger systems possessing the same functionalities. Multifunctional materials may be viewed as an expansion of the concept of composite materials. Needs exist to design, manufacture and model such materials, as well as demonstrate their performance benefits relative to conventional composites and monolithic materials. Simultaneously, needs continue to exist to properly characterize the time-dependent behaviors of conventional materials, for use in product designs of various types. Recent developments have emphasized the importance of scale in both designing and modeling of material systems either applied at small scales or deriving critical properties from small scale attributes, often requiring modeling innovations to capture the associated larger-scale attributes. As an example, new aerospace vehicles of reduced (e.g. bird) size are being explored, with consequent materials challenges, and heretofore unexplored aerodynamic difficulties which create opportunities for new materials applications and performance characteristics.

We are soliciting papers involving constitutive, time (rate)-dependent behavior of all materials, including modeling of the mechanics of processing/fabrication. The materials systems' time-dependent mechanical responses should be non-negligible in cases involving non-mechanical fields.

Papers dealing with modeling and experimental aspects of the subject area are sought. A wide range of topics are solicited and organized. Papers in the following general technical research areas are solicited:

- Effects of interfaces and interphases on the time-dependent behaviors of composite, hybrid and multifunctional materials
- Effects of inhomogeneities on the time-dependent behaviors of metallic and polymeric materials
- Environmental and reactive property change effects on thermomechanical and multifunctional behaviors
- Challenges in time-dependent behavior modeling in metallic and polymeric materials at low, moderate and high strain rates
- Challenges in time-dependent behavior modeling in composite, hybrid and multifunctional materials – Effects of strain rate and damage
- Modeling and characterization of fabrication processes of conventional and multifunctional materials
- Time dependent behaviors at the nanoscale

Possible topics include, but are not limited to: characterization and modeling of behavior at multiple scales; viscoelasticity, viscoplasticity; transport, chemically and electronically active processes; multiphase and biomaterial systems; thermodynamics; shape memory; mechanics of testing; dynamic rate-dependent behaviors; large deformations; residual stresses; time (rate)-dependent damage and failure; time (rate)-dependent polycrystalline, single crystal and nanocrystalline behaviors; multifunctional materials; mechanics of processing; design methods; environmental interactions; experimental methods and techniques; linear and non-linear time-dependent behavior; time (rate)-dependent composite materials of all types; numerical analysis; physical aging; rheological properties; temperature, pressure, and moisture effects on time dependence; damping; related topics.

Track 4: ENGINEERING APPLICATIONS OF RESIDUAL STRESS

Sponsored by: SEM Residual Stress Technical Division

Organized by: Gary S. Schajer, *University of British Columbia*; Gavin Horn, *University of Illinois at Urbana-Champaign*; Jay Hanan, *Oklahoma State University*

Residual stresses are self-equilibrating stresses that exist within engineering structures, independent of external loads. They are induced during almost all materials processing procedures, for example, welding/joining, casting, thermal conditioning and forming. The hidden character of residual stresses often causes them to be underrated or overlooked. However, they profoundly influence structural design and substantially affect strength, fatigue life and dimensional stability.

This track highlights the wide range of research relating to residual stresses, including stress development, control, modeling, measurement, and physical responses of engineering components. Technical contributions that relate to any aspect of residual stress are welcomed. Applications can be in (but are not restricted to) the following areas:

- Beneficial Stress Induction Methods
- Creation and Growth of Residual Stresses
- Current Issues in Industry
- Destructive (Relaxation) Measurements
- Engineered Residual Stresses
- Fatigue and Fracture
- Industrial Quality Control Applications
- Mathematical Modeling and Validation
- MEMS Packaging and Device Residual Stresses
- Non-destructive Measurements
- Novel Sensors and Measurement Techniques
- Physical Responses to Residual Stresses
- Residual Stresses in Composite Materials
- Strained Silicon-on-Insulator Substrates
- Stress Relaxation/Annealing Methods

Track 5: EXPERIMENTAL AND APPLIED MECHANICS

Organized by: Carlos E. Ventura, *University of British Columbia*; Hugh A. Bruck, *University of Maryland*; Wendy C. Crone, *University of Wisconsin-Madison*

Experimental and Applied Mechanics covers the wide variety of subjects that are related to the broad field of experimental or applied mechanics. Both research and application papers are requested. Papers will be organized into sessions based on a specific discipline. Technical contributions in the following general areas are sought:

- Applications
- Applied Photoelasticity
- Civil Structures Testing
- Composite Materials
- Education
- Electronic Packaging
- Fracture and Fatigue
- Hybrid Techniques
- Inverse Problems
- Measurements and Modeling
- Modal Analysis/Dynamic Systems
- Model Validation
- Optical Methods
- Research in Progress
- Sensors and Instrumentation
- Strain Gages
- Structural Testing
- Sustainable Technologies
- Uncertainty Quantification

Be sure to check the topics in all tracks and symposium in order to best allocate your abstract.

Submit Your Abstract Now:

sem.org

1ST INTERNATIONAL SYMPOSIUM ON THE MECHANICS OF BIOLOGICAL SYSTEMS AND MATERIALS

Sponsored by: SEM Biological Systems and Materials Technical Division

Organized by: Bart Prorok, *Auburn University*; Francois Barthelat, *McGill University*; Chad Korach, *State University of New York at Stony Brook*; K. Jane Grande-Allen, *Rice University*; Elizabeth Lipke, *Auburn University*

This symposium is aimed at providing a forum to foster the exchange of ideas and information among scientists and engineers involved in the research and analysis of how mechanical loads interact with the structure, properties and function of living organisms and their tissues. The scope includes experimental, imaging, numerical and mathematical techniques and tools spanning various length and time scales. Establishing this Symposium at the Annual Conference of the Society for Experimental Mechanics provides a venue where state-of-the-art experimental methods can be leveraged in the study of biomechanics. A major goal of the Symposium is for participants to collaborate in the asking of fundamental questions and the development new techniques to address bio-inspired problems in society, human health, and the natural world.

The organizers seek abstracts related to the potential session topics listed below.

- Bio-Inspired Education
- Bio-Inspired Materials and Biomimetic Composites
- Biological Kinematics
- Biomimetics
- Cell Mechanics
- Fracture and Fatigue of Biomaterials
- Imaging Methods in Biological Materials
- Materiomics
- Mechanics of Biomolecules
- Mechanics of Hard Biological Tissues
- Mechanics of Hydrogels
- Mechanics of Soft Biological Tissues
- MEMS for Biological Applications
- Nanomechanics in the Natural World
- Simulation and Modeling in Biological Systems and Materials

ELECTRONIC SUBMISSIONS

SEM will only accept electronic submissions for the 2011 SEM Annual Conference. Details about submitting abstracts and the electronic submission form are on the SEM Web site: sem.org

All abstracts will be received electronically. No copies are required for electronic submission. Do not fax. Do not send duplicate submissions. Accepted papers will also be received electronically, per guidelines on the SEM Web site, and only a CD-ROM Proceedings will be available for the 2011 SEM Annual Conference.

Please submit a short abstract of the paper (not more than 200 words) electronically by October 18, 2010. Do not include photos or equations in your abstract. Abstract submissions for the MEMS Symposium must include 5 keywords.

Please Note: Once you have successfully submitted your abstract, a confirmation message will appear on the screen. This is the only confirmation that you will receive. If you have questions or concerns about abstract submittal, please contact SEM at 203-790-6373 or shari@sem1.com.

Authors will be notified, via email, whether the abstract has been accepted or not by December 16, 2010. Accepted authors will be required to submit the finished paper electronically by March 16, 2011. NOTE: If you have not received notification regarding your abstract by January 3, 2011 please contact Kathy Ramsay or Shari Matthews at 203-790-6373, or shari@sem1.com.

Presentation slots in the final program are guaranteed only for authors who submit a written paper by March 16, 2011.

12TH INTERNATIONAL SYMPOSIUM ON MEMS AND NANOTECHNOLOGY

Sponsored by: SEM MEMS and Nanotechnology Technical Division

Organized by: Cosme Furlong, *Worcester Polytechnic Institute*; Gordon A. Shaw *National Institute of Standards and Technology*; Barton Prorok, *Auburn University*; Ryszard J. Pryputniewicz, *Worcester Polytechnic Institute*

Microelectromechanical systems (MEMS) and Nanotechnology are revolutionary enabling technologies. These technologies merge the functions of sensing, actuation, and controls with computation and communication to affect the way people and machines interact with the physical world. This is done by integrating advances in various multidisciplinary fields to produce very small devices that use very low power and operate in many different environments. Today, developments in MEMS and Nanotechnology are being made at an unprecedented rate, driven by both technology and user requirements. These developments depend on micromechanical and nanomechanical analyses, and characterization of structures comprising nanophase materials.

To provide a forum for an up-to-date account of the advances in the fields of MEMS and Nanotechnology and to promote an alliance of governmental, industrial, and academic practitioners, SEM initiated a *Symposium Series on MEMS and Nanotechnology*. *The 2011 Symposium will be the twelfth in the series* and will address pertinent issues relating to design, analysis, fabrication, testing, optimization, reliability, and applications of MEMS and Nanotechnology, especially as these issues relate to experimental mechanics of the microscale and nanoscale structures. Papers are sought in the following and related areas:

- Bio MEMS
- Composite MEMS
- Computational Methods
- Deformation and Damage at the Nanoscale
- Design, Analysis, and Fabrication Methods
- Education in MEMS and Nanotechnology
- Fatigue and Fracture in MEMS and NEMS
- Influence of Design and Fabrication Methods on Reliability and Durability of MEMS and NEMS
- Integration of MEMS and Nanotechnology into Systems
- MEMS and NEMS for Extreme Environments and Homeland Security
- MEMS Applications in Telecommunications and Wireless Systems: Health Monitoring of Structures
- MEMS in Flight and Aerospace Applications
- MEMS Packaging
- Metrology, Including Full-field and Local Testing and Characterization Based on Electrical, Mechanical, Optical, and other Methods
- Microfluidics, Biofluidics, and Lab-on-a-chip
- Micromechanics and Nanomechanics
- Micromechanics and Nanomechanics of High-density Data Storage Technologies (i.e., Millipede System)
- Nanoscale Strain and Stress Measurements
- Novel Applications of MEMS and NEMS
- Novel Materials, their Characterization, and Applications
- Optical MEMS
- RF MEMS
- Scaling Effects
- Sensors: Temperature, Pressure, Humidity Flow, Motion, etc.
- Standardization



Organized by the
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Experimental Mechanics in the Age of Modeling and Simulation



June 13-15, 2011

Location

SEM's 2011 Annual Conference & Exposition will be held at Mohegan Sun in Uncasville, Connecticut USA. Details about the location can be found on the SEM Web site, sem.org. Contact the hotel directly for reservations:

MOHEGAN SUN

1 Mohegan Sun Blvd., Uncasville, CT 06382

Reservations Phone: 877-664-3426

Reservations Fax: 860-862-4822

Rates: \$199+ (Taxes currently 12%)

Hotel Deadline: May 20, 2011

Mohegan Sun is situated on 240 acres along the Thames River in Southeastern Connecticut. It offers not only spectacular gaming opportunities, but incredible relaxation at Elemis Spa, located within the Mohegan Sun hotel, as well as more than 80 shops and restaurants. Mohegan Sun Country Club at Pautipaug is a private 18-hole championship golf course complete with a pro shop, clubhouse, driving range, and more.

Mohegan Sun is located halfway between New York City and Boston, just minutes off interstate 95 and 395. Two international airports in Hartford, CT and Providence, RI are within a one-hour drive. Amtrack is ten minutes away in New London, CT. For more information on getting to Mohegan Sun, visit mohegansun.com/getting here.

**HOTEL RESERVATION DEADLINE:
May 20, 2011**

Submit abstracts online by October 18, 2010