

SPIE



Smart Structures/NDE

**Smart Structures and Materials &
Nondestructive Evaluation and Health Monitoring**

16th Annual International Symposium

Course: 8 March 2009

Conferences: 9–12 March 2009

Exhibition: 10–11 March 2009

San Diego Town and Country Resort and Convention Center
San Diego, California, USA

Technical Program



SPIE

Connecting minds. Advancing light.

Welcome

The Organizing Committee of SPIE's 16th Annual International Symposium on Smart Structures and Materials & Nondestructive Evaluation and Health Monitoring would like to welcome you to what promises to be an exciting meeting. This unique symposium offers many opportunities to network with colleagues from a variety of disciplines in academia, industry, and government from all over the world. Over the last fifteen years, this meeting has grown from small beginnings in the then-emerging field of smart systems into a premier symposium. This symposium has been the incubator for the emergence of the field of electroactive polymers, also known as artificial muscles, and the EAP-in-Action demonstration is now one of its exciting annual events.

Complementary techniques and application of smart structures and materials have been discussed in the joint symposium with NDE and Health Monitoring for the past four years. This event has developed into one of the world's most important events discussing the monitoring of structural integrity and adaptive/intelligent structures. Now, both symposia are integrated into a single event. This integration offers new avenues for collaboration and interaction opportunities to bring more advances and address greater challenges that lie ahead. Such challenges include areas of homeland security, and benefiting from exciting fields of biomimetics, nanotechnologies, and others.

The Symposium covers all aspects of the evolving fields of materials, enabling technologies, sensor/actuator design and fabrication, MEMS, NEMS and other micro-, nano- and bio-electronic devices, biomimetics, signal processing and control, systems concepts, wireless sensors and sensor networks, modeling and simulation, and applications of these technologies to cover the whole spectrum of life in the 21st century including commercial, medical, aerospace, military uses and many others. It also includes several parallel conferences on a range of topics related to NDE, health monitoring, safety, security, characterization of materials, and detection of materials defects and degradation, application of micro- and nanomaterial systems, health monitoring of structural and biological systems, NDE for aerospace materials and applications, and NDE technologies for homeland security.

The symposium is organized in ten parallel conferences. It will bring together emerging technologies and advanced research in instrumentation, sensing, and measurement science with progressive management and diagnostic approaches and smart systems. Engineers and researchers from government, military, academia and the commercial sector will discuss the current status and future directions of smart structures and materials, NDE, and health monitoring. Case studies, emerging research agendas, and innovative new technologies will be presented.

This meeting is a showcase for multidisciplinary research and provides an excellent opportunity to explore new research areas by teaming with new partners from fields other than your own. We hope you enjoy your stay in San Diego!

2009 Symposium Chairs



Alison B. Flatau, Univ. of Maryland, College Park



Donald J. Leo, Virginia Polytechnic Institute and State Univ.



George Y. Baaklini, NASA Glenn Research Ctr.



Kara J. Peters, North Carolina State Univ.

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Sponsored by



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Jet Propulsion Lab.

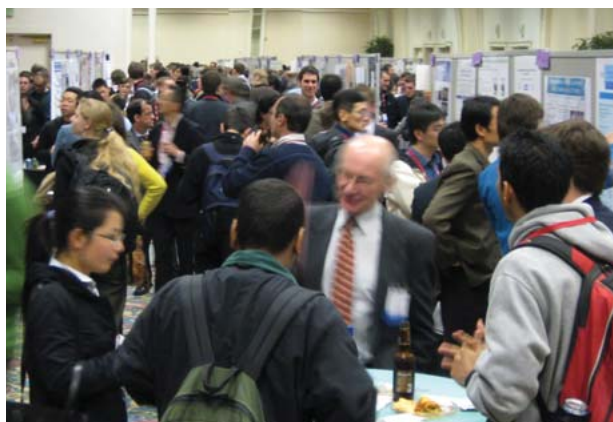
National Science Foundation

Executive Committee

Alison B. Flatau, Univ. of Maryland/College Park
George Y. Baaklini, NASA Glenn Research Ctr.
Donald J. Leo, Virginia Polytechnic Institute and State Univ.
Kara J. Peters, North Carolina State Univ.
Mehdi Ahmadian, Virginia Polytechnic Institute and State Univ.
Yoseph Bar-Cohen, Jet Propulsion Lab.
Jung-Chih Chiao, The Univ. of Texas at Arlington
Aaron A. Diaz, Pacific Northwest National Lab.
Wolfgang Ecke, Institut für Physikalische Hochtechnologie e.V. (Germany)
Mehrdad N. Ghasemi-Nejhad, Univ. of Hawai'i at Manoa
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Benjamin K. Henderson, Air Force Research Lab.
Kumar V. Jata, Air Force Research Lab.
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Douglas K. Lindner, Virginia Polytechnic Institute and State Univ.
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2009 Promotional Partners

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Technical Conferences 12-44

Modeling, Signal Processing, and Control III (Lindner)	12-42
Electroactive Polymer Actuators and Devices (EAPAD) XI (Bar-Cohen)	12-42
Active and Passive Smart Structures and Integrated Systems III (Ahmadian)	12-42
Behavior and Mechanics of Multifunctional Materials and Composites III (Ounaies)	12-42
Industrial and Commercial Applications of Smart Structures Technologies III (Henderson)	12-24
Nano-, Bio-, and Info-Tech Sensors and Systems (Varadan)	13-32
Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems (Tomizuka)	13-44
Smart Sensor Phenomena, Technology, Networks, and Systems II (Meyendorf)	13-35
Nondestructive Characterization for Composite Materials, Aerospace Engineering, Civil Infrastructure, and Homeland Security III (Wu)	13-35
Health Monitoring of Structural and Biological Systems III (Kundu)	13-44

Don't miss the Exhibition!

See page 9.

Plenary Presentations

Future Challenges in Aeronautics R&D

Pacific Salons I-III

Monday 9 March 8:30 to 9:15 am



Jaiwon Shin, NASA

Jaiwon Shin is the NASA Associate Administrator for the Aeronautics Research Mission Directorate. In this position, he manages the agency's aeronautics research portfolio and guides its strategic direction. This portfolio includes research in the fundamental aeronautics of flight, aviation safety and the

nation's airspace system.

Shin co-chairs the National Science & Technology Council's Aeronautics Science & Technology Subcommittee. Comprised of federal departments and agencies that fund aeronautics-related research, the subcommittee wrote the nation's first presidential policy for aeronautics research and development (R&D). The policy was established by Executive Order 13419 in December 2006 and will guide U.S. aeronautics R&D programs through 2020. The subcommittee finished writing the National Aeronautics R&D Plan in December 2007 and is currently writing the Research, Development, Test and Evaluation (RDT&E) Infrastructure Plan both of which were called for by the Executive Order.

Between May 2004 and January 2008, Shin served as deputy associate administrator for the Aeronautics Research Mission Directorate where he was instrumental in restructuring NASA's aeronautics program to focus on fundamental research and better align with the nation's Next Generation Air Transportation System (NextGen).

Prior to coming to work at NASA Headquarters, Shin served as chief of the Aeronautics Projects Office at NASA's Glenn Research Center. In this position he had management responsibility for all of the center's aeronautics projects. Prior to this he was Glenn's deputy director of aeronautics, where he provided executive leadership for the planning and implementation of Glenn's aeronautics program, and interfaced with NASA Headquarters, other NASA centers, and external customers to explore and develop technologies in aeropropulsion, aviation safety and security, and airspace systems.

Between 1998 and 2002, Shin served as chief of the Aviation Safety Program Office, as well as the deputy program manager for NASA's Aviation Safety Program and Airspace Systems Program. He assisted both program directors in planning and research management.

Dr. Shin received his doctorate in mechanical engineering from the Virginia Polytechnic Institute and State University, Blacksburg, Virginia. His bachelor's degree is from Yonsei University in Korea and his master's degree is in mechanical engineering from the California State University, Long Beach. His honors include NASA's Outstanding Leadership Medal, NASA's Exceptional Service Medal, a NASA Group Achievement Award, Lewis Superior Accomplishment Award, three Lewis Group Achievement Awards, and an Air Force Team Award. He is a graduate of the Senior Executive Fellowship Program at the Kennedy School of Government at Harvard University. He has extensive experience in high speed research and icing, and has authored or co-authored more than 20 technical and journal papers.

Beyond PZT-Based Actuators: Bridging Material Science and Engineering

Pacific Salons I-III

Monday 9 March 9:15 to 10:00 am



Paolo Ermanni, ETH Zurich, Centre of Structure technologies

Composite materials have allowed engineers to control and design material properties and thus to achieve optimized solutions for load carrying structures and components. Design of next generation products will take advantage of adaptive materials with their capabilities of

controlled changes and adaptation in mechanical and physical properties. Adaptive material systems integrate actuators, sensors, energy conversion or dissipation elements that interact with the host structures by means of appropriate control devices. In this context adaptive material systems open new perspectives in terms of structural efficiency, multi-functionality and adaptation to changing conditions of the operating environment.

Different classes of materials have been a matter of intense research in the past decade. Based on the research activities conducted at EMPA and ETHZ, the first part of the talk is providing an introduction about properties and technologies for adaptive materials with regard to structural applications. Even though significant progress has been achieved, intense research in science and technology of functional materials is still mandatory to overcome the intrinsic limitations of current available materials. In this context the talk will highlight some contributions in the field of piezoceramic fibers, dielectric elastomers, iron-based shape memory alloys, ferromagnetic shape memory alloys, carbon nanotube based material systems and functionalized polymeric foams. In our approach, material development is driven by the continuous interaction between scientists and engineers towards the implementation of the functional properties of those materials in technically viable engineering solutions. Consequently, the second part of the talk will be devoted to the design, realization and integration of sensors and actuators for shape and vibration control, structural health monitoring and compliant systems. Applications cover a variety of industrial sectors and product ranges such as biomedical industry, mechanical and civil engineering, transportation, energy, aerospace industry, and mechatronics.

Paolo Ermanni is Professor of Structure Technologies, Head, of the Centre of Structure Technologies, and the Director of the Centro Stefano Franscini (CSF), the International Conference Centre of ETH Zurich. He is a member of the International Advisory Board, Intl Conference on Flow Processes in Composite Materials (FPCM); the Editorial Board of Composite Science and Technology, ETH Zurich, Konferenz des Lehrkörpers (KdL), 2005-present; International Program Committee of the Intl. Conference on Adaptive Structures and Technologies (ICAST); ETH Zurich Studienkommission; Research Commission of the EMPA (Swiss Federal Institute for Material Research and Technology); European Board of the SAMPE (Society for advancement of Materials and Processes); Review Panel of the DFG on Material Science and Engineering, excellence initiative of the German Government to promote science and research; and he is the president of the Swiss SAMPE Chapter. He has published over 80 research articles in peer-reviewed journals and proceedings.

Energy Harvesting: Small Scale Energy Production from Ambient Sources

Pacific Salons I-III

Tuesday 10 March 8:20 to 9:05 am



Eric M. Yeatman, Imperial College London (United Kingdom)

Energy harvesting – the collection of otherwise unexploited energy in the local environment – is attracting increasing attention for the powering of electronic devices. While the power levels that can be reached are typically modest (microwatts to milliwatts), the key motivation

is to avoid the need for battery replacement or recharging in portable or inaccessible devices. Wireless sensor networks are a particularly important application: the availability of essentially maintenance free sensor nodes, as enabled by energy harvesting, will greatly increase the feasibility of large scale networks, in the paradigm often known as pervasive sensing. Such pervasive sensing networks, used to monitor buildings, structures, outdoor environments or the human body, offer significant benefits for large scale energy efficiency, health and safety, and many other areas. Sources of energy for harvesting include light, temperature differences, and ambient motion, and a wide range of miniature energy harvesters based on these sources have been proposed or demonstrated. This talk will review the principles and state-of-art in miniature energy harvesters, and discuss trends, suitable applications, and possible future developments.

Eric M. Yeatman completed his B.Eng in Engineering Physics at Dalhousie University, Canada, in 1985, and his PhD in Electrical Engineering at Imperial College London in 1989. Since then he has been a member of academic staff in the College’s Electrical and Electronic Engineering Department, where he is now Deputy Head. He was appointed Professor of Microengineering in 2005. He was co-founder of the MEMS research activity at Imperial, now the biggest such activity in UK academia. He has published over 130 papers and 7 patents, with frequently cited work in surface plasmon microscopy, integrated optics on silicon, and MEMS energy harvesting. A consistent theme of his research has been the integration of functional electrical and optical materials in micro-engineered devices. He is Chairman and co-founder of the start-up company Microsaic Systems Ltd, which develops sensing instruments based on silicon micro-engineering. He is a Fellow of both the Institution of Engineering and Technology (formerly the IEE), and the Institute of Materials, Minerals and Mining.

NDE Simulations: Critical Tools in the Integration of NDE and SHM

Pacific Salons I-III

Wednesday 11 March 8:20 to 9:05 am



R. Bruce Thompson, Iowa State University

Abstract: Nondestructive Evaluation (NDE) and Structural Health Monitoring (SHM) are closely related technologies intended to assure the safe and reliable operation of structural components at an affordable cost. The paper will start with a brief review of common design strategies to assure the structural integrity of components

and of the role that NDE and SHM play within those strategies. Included will be a discussion of the metrics used to quantify the effectiveness of NDE and SHM, such as probability of detection (POD), and how these metrics influence the selection of the optimal noninvasive strategy to assure structural integrity. In many cases, this will involve a combination of traditional NDE measurements performed at discrete time intervals and SHM measurements providing information on a continuous or semi-continuous basis at discrete sensor locations. It will then be suggested that NDE/SHM simulators are key engineering tools in designing these specific measurement configurations and in determining the optimum balance between these two measurement philosophies. Included in that discussion will be a review of the development of NDE simulators, a discussion of applications they that are finding in traditional NDE, including Model-Assisted Probability of Detection (MAPOD) determination, and a suggestion of how simulations could be integrated into SHM strategies. The talk will conclude with a discussion of possible future directions.

R. Bruce Thompson is the Director of the Center for Nondestructive Evaluation and a Distinguished Professor in the Department of Materials Science & Engineering and in the Department of Aerospace Engineering. He received his B.A. in Physics from Rice University (1964), his M.S. in Physics from Stanford University (1965) and his Ph.D in Applied Physics from Stanford University (1971). From 1970 to 1980 he served as a member of the technical staff and Group Leader of Ultrasonic Applications at the Rockwell International Center before coming to Iowa State University.

Thompson’s research interests fall in the area of ultrasonic nondestructive evaluation, including noncontact sensors, microstructure characterization, measurement models, and model-assisted determination of probability of detection.

Thompson is the author of 6 major invited review articles, over 90 articles in archival journals and over 250 papers in edited conference proceedings. He has been awarded 23 U.S. patents, presently serves as the Editor-in-Chief of the Journal of Nondestructive Evaluation, and is a member of the National Academy of Engineering.

A Paleo-aerodynamic Exploration of the Evolution of Nature’s Flyers, Man’s Aircraft, and the Needs and Options for Future Technology Innovations

Pacific Salons I-III

Thursday 12 March 8:20 to 9:05 am



Brenda M. Kulfan, The Boeing Co.

Abstract: This presentation will provide insights and observations of some fascinating aspects of birds, bugs and flying seeds, of inspired aerodynamic concepts, and visions of past, present and future aircraft developments. An interesting view will be presented relating the contrasting driving forces for the evolution-of-flight in nature, and the corresponding evolution of commercial aircraft.

We will explore similarities between nature’s creations and man’s inventions. In spite of the tremendous technological growth leading to today’s aircraft, there remains many critical areas requiring future significant technology based solutions. With the advent of UAVs and MAVs, the gap between “possible” and “actual” is once again very large. Various technology development strategies will be discussed along with the pros and cons for each. It will be shown that future development should include a synergistic coupling of push, pull and acceleration strategies. We will consider a number of biologically based technology development options. However, in order to copy nature, we must first understand nature. Consequently, allometric scaling procedures will be used to explore size implications on limitations and performance capabilities of nature’s flyers and nature in general. Biologically related technology development concepts including: bionics, biomimicry, neo-bionic, pseudo-mimicry, cybernetic and non-bionic approaches will be discussed and illustrated with examples. The overall objective is to inspire the creative nature that exists within all of us.

Brenda M. Kulfan is a Technical Fellow in Boeing Commercial Airplanes Enabling Technology and Research Organization. She received her BS and MS degrees in Aeronautics and Astronautics Engineering from the University of Michigan (1959, 1960). She has 48 years of engineering experience with extensive knowledge of the fundamentals and flow physics related to subsonic, transonic and supersonic flows. She has developed numerous methods for drag prediction, configuration analysis, design optimization and leading edge vortex formation. She participated in the US SST program, Supersonic Cruise Research, SCR, and the more recent High Speed Civil Transport studies as well as many Boeing internal advanced technology and aircraft programs. She has been the principal investigator on numerous Government Contracts related to Transonic Aircraft, Variable Sweep Oblique Wings, Supersonic Propulsion / Airframe Interference, Natural Laminar Flow, Variable Camber, Subsonic Military Transports, Laminar Flow Control, Large Span and Strut-Braced Wings, Application of Hypersonic Favorable Aerodynamic Concepts to Supersonic Aircraft. She recently developed the new powerful CST universal geometry representation method. She has received numerous requests to lecture in the U.S., Europe, and in Asia. She has authored over 80 technical papers and reports. She has 2 supersonic aircraft patents.

Special Events

Welcome Reception

Trellises Pool Area

Monday 9 March 6:00 to 7:30 pm

All attendees are invited to relax, socialize, and enjoy refreshments in a tropical poolside setting. Please remember to wear your conference registration badges. Dress is casual.

NIST Funding Agency Talk: Current and Future Programs and Initiatives

Pacific Salons I-III

Tuesday 10 March. 8:05 to 8:20 am

H. Felix Wu, National Institute of Technology and Standards

ONR Funding Agency Talk: Current and Future Programs and Initiatives

Pacific Salons I-III

Wednesday 11 March 8:05 to 8:20 am

Paul Hess/Liming Salvino, Office of Naval Research (United States)

NSF Funding Agency Talk: Current and Future Programs and Initiatives

Pacific Salons I-III

Thursday 12 March 8:05 to 8:20 am

Donald Senich, National Science Foundation (United States)

Student Lunch with the Experts—A Networking Event

Tiki Pavilion

Tuesday 10 March. 12:30 to 1:30 pm

See *Ticket for Location. Seating is Limited.*

Combine food, fun, and valuable networking opportunities at this complimentary event hosted by SPIE Student Services. Join experts willing to share their collective wisdom and experience at this casual and lively event.

Students receive one complimentary ticket with registration.

Posters/Exhibition Reception

Exhibition Hall, Golden Ballroom

Tuesday 10 March. 6:00 to 7:30 pm

A joint poster session and exhibition reception will be held on Tuesday evening for all attendees. Refreshments will be served.

Poster Viewing

Golden Ballroom

Tuesday 10 March. 10:00 am to 4:00 pm

Wednesday 11 March 10:00 am to 4:00 pm

Conference attendees are invited to attend the poster session on Tuesday evening. Come view the posters, ask questions, and enjoy the refreshments. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Posters will also be available for viewing on Wednesday during Exhibition Hours.

Poster Setup

Poster presenters may set up between 10:00 am and 4:00 pm on Tuesday 10 March. Poster presenters who have not set up by 4:00 pm on Tuesday will be considered a “no show” and their manuscript will not be published. Presenters must remove their posters on Wednesday by 4:00 pm. Posters not removed will be considered unwanted and will be discarded. SPIE assumes no responsibility for posters left up after 4:00 pm on Wednesday 11 March.

Best Student Paper Session

Towne Room

Tuesday 10 March 3:30 to 6:00 pm

Finalists for the SPIE/ASME Best Student Paper Award will present their papers in this special session.

EAPAD Keynote Presentation

Pacific Salons I-III

Monday 9 March 10:30 to 11:10 am

The simulation of humans and lower animals

Paper No. 7287-1



Demetri Terzopoulos, Univ. of California, Los Angeles (United States)

The field of computer animation has made significant strides through physics-based modeling and control. I will first review our earlier work that focused on realistically animating lower animals, particularly muscle-based piscine locomotion, and then cover our more recent work on the detailed biomechanical modeling and control of the human body. With respect to the latter, I will present a comprehensive biomechanical simulator of the entire body confronting the combined challenge of modeling and controlling more or less all of the relevant articular bones and muscles, as well as simulating the physics-based deformations of the soft tissues. An important component of our model is the neck-head-face complex, addressing the important role that the neck plays in generating the head movements that are essential to so many aspects of human behavior. Our anatomically consistent biomechanical model confronts us with many challenging motor control problems, even for the relatively simple task of balancing the mass of the head in gravity atop the cervical spine. I will present a neuromuscular control model that emulates the relevant biological motor control mechanisms. Employing machine learning techniques, the neural networks within our neuromuscular controllers are trained offline to efficiently generate the pose and stiffness control signals necessary to synthesize a variety of autonomous human movements.

Biography: **Demetri Terzopoulos** is the Chancellor's Professor of Computer Science at the University of California, Los Angeles. He received his PhD from MIT in 1984 and is a Fellow of the ACM, IEEE and the Royal Society of Canada. His many awards and honors include an Academy Award for Technical Achievement from the Academy of Motion Picture Arts and Sciences for his pioneering work on physics-based computer animation, and the inaugural Computer Vision Significant Researcher Award from the IEEE for his pioneering and sustained research on deformable models and their applications. He has published more than 300 research papers and several volumes, primarily in computer graphics, computer vision, medical imaging, computer-aided design, and artificial intelligence/life.

Eleventh Annual EAP-in-Action Session and Demonstrations

Pacific Salons I-III

Monday 9 March 4:30 to 5:45 pm

Session Chair: **Yoseph Bar-Cohen**, Jet Propulsion Lab.

This Session is intended to turn the spotlight on Electroactive Polymers (EAP) materials, their capability, and their potential for smart structures. New materials and applications are continuing to emerge and this is a great opportunity for the attendees to see state-of-the-art demonstrations of the unique capabilities of EAP as possible actuators-of-choice. This Session offers a forum for interaction between developers and potential users as well as a "hands-on" experience with this emerging technology. It was during this session that the first Human/EAP-Robot Armwrestling Contest was held in 2005.

Tentative Demonstrations



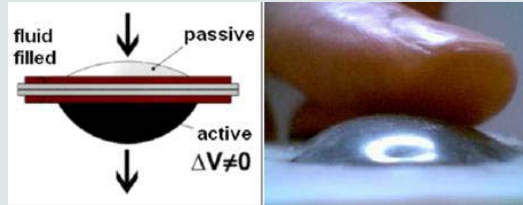
Facial expression-driven system using dielectric elastomer actuator

Jinsong Leng, Harbin Institute of Technology (China)

The performance of PolyPower® DEAP

Hans-Erik Kiil, Michael Tryson, Danfoss PolyPower A/S, Nordborg (Denmark)

1. PolyPower DEAP material
2. Powerful Push & Pull actuating devices
3. PolyPower based actuator in an industrial demonstration



Hydrostatically coupled dielectric elastomer actuators

Federico Carpi, Univ. of Pisa (Italy)



EPAM-based energy harvester

Mikio Waki, Hyper Drive Corp. (Japan); **Roy Kornbluh, Philip von Guggenberg, Seiki Chiba**, SRI International

Dielectric Elastomer (DE) EAP demonstrations

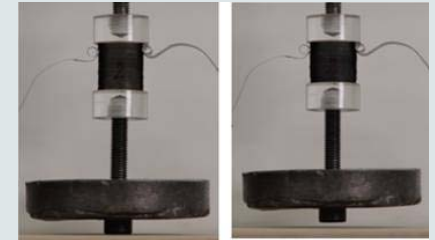
Iain Anderson, Emilio Calius, Todd Gisby, Ben O'Brien, Thomas McKay and **Scott Walbran**, The Auckland Bioengineering Institute (New Zealand)

1. DE Actuator (DEA) based rotary motor
2. DE Minimum Energy Structures (DEMES) and their applications
3. Fine control of DEAs using capacitive self sensing
4. DEA as art form



Contractive tension force stack actuator based on soft dielectric EAP

Gabor Kovacs, EMPA Dübendorf (Switzerland)



Devices based on the AMI SmartMOVE actuator technology including diaphragm pumps, valves, and haptic displays

John Bashkin, Al Zarrabi, Peter Gise, Artificial Muscle, Inc., (United States)



Contractile electroactive polymeric materials

Lenore Rasmussen, Ras Labs, LLC (United States)

Awards

Pacific Salons I-III

Monday 9 March 8:15 to 8:30 am

2009 SSM Lifetime Achievement Award



Presented to **Dr. Gordon Wallace**, Wollongong Univ. (Australia)

Gordon Wallace is Director of the Intelligent Polymer Research Institute and Executive Research Director of the ARC Centre of Excellence for Electromaterials Science. His research interests include organic conductors, nanomaterials and electrochemical probe methods of analysis and the use of these in

the development of Intelligent Polymer Systems. A current focus involves the use of these tools and materials in developing biocommunications from the molecular to skeletal domains in order to improve human performance via medical Bionics.

Gordon was elected as a Fellow of the Australian Academy of Technological Sciences and Engineering in 2003 and Fellow of the Australian Academy of Science in 2007. He was elected as a Fellow of the Institute of Physics (UK) in 2004. He is a Fellow of the Royal Australian Chemical Institute (RACI). He received the Inaugural Polymer Science and Technology award from the Royal Australian Chemical Institute (RACI) in 1992. He was awarded an ETS Walton Fellowship by Science Foundation Ireland in 2003. He received the RACI Stokes Medal for research in Electrochemistry in 2004.

He completed his undergraduate (1979) and PhD (1983) degrees at Deakin University. He was awarded a DSc from Deakin University in 2000.

He has published more than 450 refereed publications and a monograph (3rd Edition published in 2009) on Conductive Electroactive Polymers: Intelligent Polymer Systems. He has supervised 55 PhD students to completion.

2009 NDE Lifetime Achievement Award



Presented to **Dr. R. Bruce Thompson**, Iowa State Univ.

R. Bruce Thompson is the Director of the Center for Nondestructive Evaluation and a Distinguished Professor in the Department of Materials Science & Engineering and in the Department of Aerospace Engineering. He received his B.A. in Physics from Rice University (1964), his M.S. in Physics from Stanford University (1965)

and his Ph.D in Applied Physics from Stanford University (1971). From 1970 to 1980 he served as a member of the technical staff and Group Leader of Ultrasonic Applications at the Rockwell International Center before coming to Iowa State University.

Thompson's research interests fall in the area of ultrasonic nondestructive evaluation, including noncontact sensors, microstructure characterization, measurement models, and model-assisted determination of probability of detection.

Thompson is the author of 6 major invited review articles, over 90 articles in archival journals and over 250 papers in edited conference proceedings. He has been awarded 23 U.S. patents, presently serves as the Editor-in-Chief of the Journal of Nondestructive Evaluation, and is a member of the National Academy of Engineering.

Tuesday 10 March 8:00 to 8:05 am

ASME Gary Anderson Early Achievement Award

This award is given for notable contribution(s) to the field of Adaptive Structures and Material Systems.

Smart Structures Product Implementation Award

This award is intended to recognize those individuals or companies who have taken the critical step of transitioning smart structures technologies into viable industrial and commercial products. These visionaries are required for this important field of science and engineering to be recognized and accepted in the world at large.

A panel of independent experts selects the best product based on its importance, uniqueness, and usefulness to defense or commercial industries. We are looking for the most innovative—but realistic—products using smart structures and materials technologies. System integration aspects are very important criterion as well.

The award will be presented during the SPIE Smart Structures and Materials Symposium in front of a group of peers and potential customers. SPIE will publish news items will be sent to appropriate trade journals. In addition, the winning company will be able to use the recognition associated with this award in any of its subsequent marketing and promotional endeavors.

Wednesday 11 March 8:00 to 8:05 am

SPIE/ASME Best Student Paper Award

SPIE and the ASME Adaptive Structures and Material Technical Committee are sponsoring the best student paper presentation contest. Entrants will be judged by a committee of the ASME Adaptive Structures and Materials Technical Committee. The finalists will present their papers at a special session on Tuesday afternoon evening of the meeting page 4. The committee will then vote to determine the top three finalists. The top six finalist student authors and/or student co-authors will receive certificates and cash awards.

2009 ASME Best Paper Award

The ASME Technical Committee presents two awards annually: Best Paper in Structures and Best Paper in Materials.

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	
Special Events					
<p>SC634 Electroactive Polymer Actuators and Devices, 8:30 am to 5:30 pm, p. 8</p>	<p><i>Awards and Announcements: 2009 SSM Lifetime Achievement Award presentation, and 2009 NDE Lifetime Achievement Award presentation</i>, 8:15 to 8:30 am, p. 6</p>	<p>Exhibition, p. 9 10:00 am to 4:00 pm</p>	<p>Exhibition, p. 9 10:00 am to 4:00 pm</p>	<p><i>Announcements</i>, 8:00 to 8:05 am</p>	
	<p><i>Plenary Presentation: Future Challenges in Aeronautics R&D (Shin)</i>, 8:30 to 9:15 am, p. 2</p>			<p><i>Awards and Announcements: ASME Gary Anderson Early Achievement Award, and Smart Structures Product Implementation Award</i>, 8:00 to 8:05 am, p. 6</p>	<p><i>Awards and Announcements: ASME/SPIE Best Student Paper Award and ASME Best Paper Award presentation</i>, 8:00 to 8:05 am, p. 6</p>
	<p><i>Plenary Presentation: Beyond PZT-Based Actuators: Bridging Material Science and Engineering (Ermanni)</i>, 9:15 to 10:00 am, p. 2</p>	<p><i>NIST Funding Agency Talk: Current and Future Programs and Initiatives</i>, (Wu), 8:05 to 8:20 am, p. 4</p>	<p><i>Plenary Presentation: Energy Harvesting: Small Scale Energy Production from Ambient Sources (Yeatman)</i>, 8:20 to 9:05 am, p. 3</p>	<p><i>ONR Funding Agency Talk: Current and Future Programs and Initiatives (Hess/Salvino)</i>, 8:05 to 8:20 am, p. 4</p>	<p><i>Plenary Presentation: A Paleo-aerodynamic Exploration of the Evolution of Nature's Flyers, Man's Aircraft, and the Needs and Options for Future Technology Innovations</i>, (Kulfan), p. 3</p>
	<p>Eleventh Annual EAP-in-Action Session and Demonstrations, (Yoseph Bar-Cohen), 4:30 to 5:45 pm, p. 5</p>	<p><i>Plenary Presentation: Energy Harvesting: Small Scale Energy Production from Ambient Sources (Yeatman)</i>, 8:20 to 9:05 am, p. 3</p>	<p>Student Lunch with the Experts – A Networking Event, 12:30 to 1:30 pm, p. 4</p>	<p><i>Plenary Presentation: NDE Simulations: A Critical Tool in the Integration of NDE and SHM</i>, (Thompson) 8:20 to 9:05 am, p. 3</p>	
	<p>Welcome Reception, 6:00 to 7:30 pm, p. 4</p>	<p>Poster Viewing, 10:00 am to 4:00 pm, p. 4</p>	<p>Poster Viewing, 10:00 am to 4:00 pm, p. 4</p>	<p>Poster Viewing, 10:00 am to 4:00 pm, p. 4</p>	
		<p>Posters/Exhibition Reception, 6:00 to 7:30 pm, p. 4</p>			
Conferences					
			<p>Conf. 7286 Modeling, Signal Processing, and Control III, (Lindner), p. 12-42</p>		
			<p>Conf. 7287 Electroactive Polymer Actuators and Devices (EAPAD) XI, (Bar-Cohen) p. 12-42</p>		
			<p>Conf. 7288 Active and Passive Smart Structures and Integrated Systems III, (Ahmadian), p. 12-42</p>		
			<p>Conf. 7289 Behavior and Mechanics of Multifunctional Materials and Composites III, (Ounaies), p. 12-42</p>		
			<p>Conf. 7290 Industrial and Commercial Applications of Smart Structures Technologies III, (Henderson), p. 12-24</p>		
			<p>Conf. 7291 Nano-, Bio-, and Info-Tech Sensors and Systems, (Varadan), p. 13-32</p>		
			<p>Conf. 7292 Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems, (Tomizuka), p. 13-44</p>		
			<p>Conf. 7293 Smart Sensor Phenomena, Technology, Networks, and Systems II, (Meyendorf), p. 13-35</p>		
			<p>Conf. 7294 Nondestructive Characterization for Composite Materials, Aerospace Engineering, Civil Infrastructure, and Homeland Security III, (Wu), p.13-35</p>		
			<p>Conf. 7295 Health Monitoring of Structural and Biological Systems III, (Kundu), p. 13-44</p>		

Meeting Room Locations

See full facility map on page 55.



SPIE Course

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Electroactive Polymer Actuators and Devices

SC634

Course level: Introductory • CEU .65 \$485 / \$575 USD
 Sunday 8:30 am to 5:30 pm

This course will provide an overview of the field of EAP covering the state of the art, challenges and potential. Two general classes of polymer materials are described, namely those that involve ionic mechanisms (Ionic EAP), and field activated materials (Electronic EAP). The basic mechanisms responsible for the electroactive behavior of EAP materials will be covered and compared with natural muscles. Analytical models, fabrication processes and methods of characterizing these materials will be described. Moreover, the currently considered applications will be reviewed including actuators, robotics, animatronics, medical, and biologically inspired mechanisms, so called biomimetics. The course begins with an overview of the field, current capabilities, potential and challenges. The course follows with a description of the currently available EAP materials and principles of operating them as actuators and artificial muscles. The course ends with a review of the future prospect of EAP as actuators in systems, mechanisms and smart structures for space, industrial and medical applications.

LEARNING OUTCOMES

This course will enable you to:

- identify EAP based available and emerging actuators
- learn the fundamentals of electroactive behavior in leading EAP materials
- describe the capabilities, limitations and benefits of electroactive polymers
- assess the applicability of current EAP actuators while accounting for their limitations
- understand mechanical analysis and design principles associated with EAP
- describe the future prospects of EAP materials as actuators and their applications

INTENDED AUDIENCE

Engineers, scientists and managers who need to understand the basic concepts of EAP, or are interested in learning, applying or engineering mechanisms or devices using EAP materials. Also those who wish to discover the excitement of research and development in EAP materials and their applications—present and future.

INSTRUCTORS

Yoseph Bar-Cohen is Senior Research Scientist and Supervisor, Advanced Technologies Group, at JPL. He is a leading expert in advanced actuators using electroactive polymers and ceramic materials. Dr. Bar-Cohen is a Fellow of SPIE and ASNT. He is the author/coauthor of numerous publications, has many registered patents and is the recipient of many awards and honors. Further information on: <http://ndea.jpl.nasa.gov/nasa-nde/yosi/yosi.htm>

John Madden is an Assistant Professor of Electrical & Computer Engineering at the University of British Columbia, Vancouver, Canada. His research areas include the application of EAP materials in active catheters, as well as the development and characterization of molecular and carbon nanotube actuators. <http://mm.ece.ubc.ca/>

Qibing Pei is professor of materials science and engineering at the University of California, Los Angeles. His research interests cover a wide range of soft materials and span from materials synthesis, processing, to design of functional devices. He applies molecular design and nano-scale engineering in the discovery of new polymers with novel electronic or mechanical property. http://www.seas.ucla.edu/ms/faculty1/qibing_pei.html

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Wednesday 11 March - 10:00 am to 4:00 pm

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Golden Ballroom, Exhibition Hall

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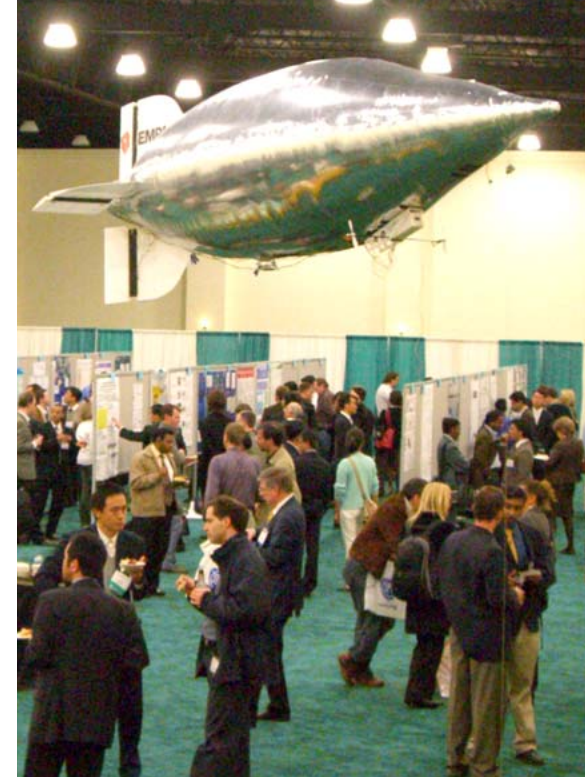
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Conference Daily Schedule

	Conf. 7287	Conf. 7288	Conf. 7289	Conf. 7290	Conf. 7291	Conf. 7292	Conf. 7293	Conf. 7294	Conf. 7295		
Monday											
8:00 to 10:00 am Plenary Presentation											
10:30 am to 12:30 pm	EAP as Emerging Actuators and Biomimetic Technologies	Micro- and Nano-Systems	Bio-inspired Systems	Ferroelectric Ceramics I: Modeling the Hysteresis Behavior	Vibration Damping and Actuator Applications	Nanomaterials	Keynote Session		Fiber Bragg Grating Sensors I	Acoustic-Ultrasound Characterization I	SHM for Aerospace Applications I: Complex Structures
1:00 to 3:10 pm	Biomimetics	PZT Energy Harvesting I	MR Systems I	Applications of Piezoelectric Ferroelectric, and Multifunctional Materials	Automotive Applications I	Nanowire, Nanotubes, and Nanostructures	Smart Materials and Systems I	Signal Processing and Damage Detection	Fiber Bragg Grating Sensors II	Acoustic-Ultrasound Characterization II	SHM for Aerospace Applications II: Sensor System Network and Related Issues
3:30 to 6:20 pm	EAP-in-Action Demonstration	PZT Energy Harvesting II	MR Systems II	Ferroelectric Ceramics II: Modeling of Ferroelectric and Piezoelectric Ceramics	Automotive Applications II	Nano Devices I	Wireless Sensors and Network I	Ultrasonics for SHM	Fiber Bragg Grating Sensor Applications	Damage Characterization in Composites	SHM for Aerospace Applications III: Damage Detection by Optical & Ultrasonic Techniques

	Tuesday										
	8:00 to 9:05 am Plenary Presentation										
9:10 to 10:10 am	Electronic EAP	Energy Harvesting I	MR Systems III	Shape Memory Materials I: Shape Memory Alloys	Aerospace Applications	Nano Devices II	Novel Sensors I	Damage Detection	Sensor Networks I	Civil Infrastructure Health Monitoring I	Novel Instrumentation and Sensing for SHM I
10:35 to 12:35 pm		Energy Harvesting II	Piezo Systems I		Applications of Shape Memory Polymers (SMP) I	Organic Electronics and Nanodevices	Wireless Sensors and Network II	Modeling and Design of Smart Systems	Sensor Networks II	Civil Infrastructure Health Monitoring II	Guided Waves for SHM I: Metal Waveguides and Temperature Effect
1:30 to 3:10 pm	Dielectric EAP Actuators	Energy Harvesting III	Piezo Systems II	Shape Memory Materials II: Shape Memory Alloys	Applications of Shape Memory Polymers (SMP) II	Sensors	SHM and Damage Detection I	Innovative Sensing Technologies	Smart Sensors I	Radar NDE Technologies	Guided Waves for SHM II: Fatigue Damage and Crack Detection
3:30 to 6:20 pm	Fabrication and Characterization of EAP	Shape Memory Alloy Systems	Piezo Systems III	Shape Memory Materials III: Shape Memory Polymers		Systems	Novel Sensors II	Nanotechnology in SHM/NDE	Smart Sensors II	Thermographic Imaging	Guided Waves for SHM III: New Concepts and Applications

Conf. 7286		Conf. 7287		Conf. 7288		Conf. 7289		Conf. 7291		Conf. 7292			Conf. 7293	Conf. 7294	Conf. 7295	
Wednesday																
8:00 to 9:05 am Plenary Presentation																
9:10 to 10:10 am	Optimization	Ionic EAP Based on IPMC		Shape Memory Alloy and Polymer Systems	Active Composites	Sensors and Systems	Modeling and Mechanics I	Monitoring Approach and Systems		Ultrasound	Fiber Optic Sensing Technologies I	Guided Waves for SHM IV: Aerospace Applications	Bio-Inspired Flapping System for SHM			
10:20 am to 12:20 pm	Smart Robotic Actuators			Integrated Systems	Active Nanocomposites I: Electro-mechanical Response of Carbon Nanotube-Polymer Composites	Wireless System and Network	Modeling and Mechanics II	Piezoelectric and Integrated Sensors			Fiber Optic Sensing Technologies II	Guided Waves for SHM V: Sensor Array	Signal Processing for SHM			
	Estimation										Optical Sensors I					
1:30 to 3:10 pm	Control of Smart Structures	Ionic EAP Based on IPMC, CNT, and CP		Passive and Active Vibration I	Active Nanocomposites II: Processing Issues and Multifunctional Response		Piezo Sensors and Guided Wave Methods	Smart Materials and Systems II		Optical Sensors II	Wireless Sensor Networks	Guided Waves for SHM VI: Nonlinear, Time Reversal, and Other Novel Techniques	SHM for Biomedical Applications			
3:30 to 6:00 pm		Modeling and Analysis of EAP		Passive and Active Vibration II	Active Polymers		Piezo Sensors and Applications	Novel Sensors III				Modeling and Simulation for SHM I	Novel Instrumentation and Sensing for SHM II			

Thursday															
8:00 to 9:05 am Plenary Presentation															
9:10 to 11:40 am	Health Monitoring	Application of EAP to Robotics	Modeling and Analysis of EAP	Passive and Active Vibration III	Magneto-Active Materials I: Magnetic SMAs		Application to Large Structures	System Identification and Interpretation	Smart Materials and Systems III			Signal Processing and Damage Detection for SHM	SHM for Civil and Infrastructure Engineering		
10:30 to 12:15 pm				Applications of EAP to Optical Devices	Passive and Active Vibration IV	Magneto-Active Materials II: Magnetolectric Coupling		Smart Sensors and SHM	SHM for Composite Materials	SHM and Damage Detection II			Emerging and Futuristic Techniques and Issues	Design of Smart Structures and Related Issues	
1:00 to 3:10 pm	Dynamic Modeling of Smart Structures	Applications of EAP		Passive and Active Vibration V	Magneto-Active Materials III		Signal Processing I	Fiber Optic Sensors for SHM I	Optical Sensors and Applications			Modeling and Simulation for SHM II	SHM of Composite Materials		
3:30 to 6:20 pm					Magneto-Active Materials IV: Magnetostriction		Signal Processing II	Fiber Optic Sensors for SHM II	Damping and Response Modification			SHM of Bridge Structures			

Technical Conferences

Conference 7286

Wed.-Thurs. 11-12 March 2009
Proceedings of SPIE Vol. 7286

Modeling, Signal Processing, and Control III

Conference Chair: **Douglas K. Lindner**, Virginia Polytechnic Institute and State Univ.

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Conference 7287

Monday-Thursday 9-12 March 2009
Proceedings of SPIE Vol. 7287

Electroactive Polymer Actuators and Devices (EAPAD) XI

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Conference 7288

Monday-Thursday 9-12 March 2009
Proceedings of SPIE Vol. 7288

Active and Passive Smart Structures and Integrated Systems III

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Monday-Thursday 9-12 March 2009
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Conference 7290

Monday-Tuesday 9-10 March 2009
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Industrial and Commercial Applications of Smart Structures Technologies III

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Conference 7291

Mon.-Wed. 9-11 March 2009
Proceedings of SPIE Vol. 7291

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Conference 7292

Monday-Thursday 9-12 March 2009
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Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems

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Conference 7293

Monday-Wednesday 9-11 March 2009
Proceedings of SPIE Vol. 7293

Smart Sensor Phenomena, Technology, Networks, and Systems II

Conference Chair: **Norbert G. Meyendorf**, Fraunhofer-Institut für Zerstörungsfreie Prüfverfahren (Germany)

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Program Committee: **Grigory Adamovsky**, NASA Glenn Research Ctr.; **Farhad Ansari**, Univ. of Illinois at Chicago; **George Y. Baaklini**, NASA Glenn Research Ctr.; **Lothar Baier**, Technical Univ. of Munich (Germany); **Xiaoyi Bao**, Univ. of Ottawa (Canada); **Hartmut Bartel**, IPHT Jena (Germany); **Bharat Bhushan**, The Ohio State Univ.; **James L. Blackshire**, Air Force Research Lab.; **Rolf Brönnimann**, EMPA (Switzerland); **Richard O. Claus**, Virginia Tech; **Brian Culshaw**, Univ. of Strathclyde (United Kingdom); **Richard David Finlayson**, Physical Acoustics Corp.; **Gerald U. Gerlach**, Technische Univ. Dresden (Germany); **Neil J. Goldfine**, Jentek Sensors, Inc.; **Joseph Grant**, NASA Stennis Space Ctr.; **Wolfgang R. Habel**, Bundesanstalt für Materialforschung und -prüfung (Germany); **Daniele Inaudi**, Smartec S.A. (Switzerland); **Albrecht Jander**, Oregon State Univ.; **Kerop D. Janoyan**, Clarkson Univ.; **YeonWan Koh**, FIBERPRO, Inc. (South Korea); **David A. Krohn**, Light Wave Venture Consulting, LLC; **Silvio Kruger**, National Research Council Canada (Canada); **Marley Kungler**, Blue Road Research; **Jinsong Lenz**, Harbin Institute of Technology (China); **Alexis Mendez**, MCH Engineering LLC; **Bernd Michel**, Fraunhofer-Institut für Zuverlässigkeit und Mikrointegration (Germany); **Jeff W. Miller**, Micron Optics, Inc.; **Marc Nikles**, Omnisens S.A. (Switzerland); **Stanislav I. Rokhlin**, The Ohio State Univ.; **Jaswinder S. Sandhu**, Santec Systems, Inc.; **Richard Selfridge**, Brigham Young Univ.; **Carl Smith**, NVE Corp.; **Holger Speckmann**, Airbus Deutschland GmbH (Germany); **Nobuo Takeda**, The Univ. of Tokyo (Japan); **Roderick C. Tennyson**, Fiber Optic Systems Technology, Inc. (Canada); **Michael D. Todd**, Univ. of California/San Diego; **Eric Udd**, Columbia Gorge Research; **Zhishen Wu**, Ibaraki Univ. (Japan); **Chung-Bang Yun**, Korea Advanced Institute of Science and Technology (South Korea); **Zhi Zhou**, Harbin Institute of Technology (China)

Conference 7294

Monday-Wednesday 9-11 March 2009
Proceedings of SPIE Vol. 7294

Nondestructive Characterization for Composite Materials, Aerospace Engineering, Civil Infrastructure, and Homeland Security III

Conference Chair: **H. Felix Wu**, National Institute of Standards and Technology

Conference Co-Chairs: **Aaron A. Diaz**, Pacific Northwest National Lab.; **Peter J. Shull**, The Pennsylvania State Univ.; **Dietmar W. Vogel**, Fraunhofer-Institut für Zuverlässigkeit und Mikrointegration (Germany)

Program Committee: **A. Emin Aktan**, Drexel Univ.; **Farhad Ansari**, Univ. of Illinois, Chicago; **Mauro J. Atalla**, United Technologies Research Ctr.; **George Y. Baaklini**, NASA Glenn Research Ctr.; **Yoseph Bar-Cohen**, Jet Propulsion Lab.; **Oral Buyukozturk**, Massachusetts Institute of Technology; **Fu-Kuo Chang**, Stanford Univ.; **Howard Chung**, Acellent Technologies, Inc.; **Masoud Ghandehari**, New York Univ. Polytechnic Institute; **Hamid Ghasemi**, Federal Highway Administration; **Andrew L. Gyekenyesi**, NASA Glenn Research Ctr.; **Clem Hiel**, Composite Support and Solutions, Inc.; **Maria Q. Feng**, Univ. of California, Irvine; **Xiaoning Jiang**, TRS Technologies, Inc.; **Amrita Kumar**, Florida State Univ.; **Anne S. Kiremidjian**, Stanford Univ.; **Garo K. Kiremidjian**, Sensometrics, Inc.; **Stephen K. L. Lee**, Hong Kong Univ. of Science and Technology (Hong Kong China); **James C. Leslie**, Advanced Composite Products and Technology, Inc.; **Jerome P. Lynch**, Univ. of Michigan; **Richard E. Martin**, Cleveland State Univ.; **Theodore E. Matikas**, Univ. of Ioannina (Greece); **Xiaolin Meng**, The Univ. of Nottingham (United Kingdom); **Aftab A. Mufti**, Univ. of Manitoba (Canada); **Didem Ozevin**, Physical Acoustics Corp.; **Masanobu Shinozuka**, Univ. of California, Irvine; **Kurt L. Silvers**, Pacific Northwest National Lab.; **Lizhi Sun**, Univ. of California, Irvine; **Bernhard R. Tittmann**, The Pennsylvania State Univ.; **Brian J. Tucker**, Pacific Northwest National Lab.; **Ming L. Wang**, Northeastern Univ.; **Yang Wang**, Georgia Institute of Technology; **Glenn A. Washer**, Univ. of Missouri, Columbia; **Tzu-Yang Yu**, Univ. of Massachusetts, Lowell; **Ying Zhang**, Georgia Institute of Technology, Savannah

Conference 7295

Monday-Thursday 9-12 March 2009
Proceedings of SPIE Vol. 7295

Health Monitoring of Structural and Biological Systems III

Conference Chair: **Tribikram Kundu**, The Univ. of Arizona

Conference Co-Chair: **Kumar V. Jata**, Air Force Research Lab.

Program Committee: **Douglas E. Adams**, Purdue Univ.; **Sauvik Banerjee**, IIT (India); **Sourav Banerjee**, Acellent Technologies, Inc.; **Yoseph Bar-Cohen**, Jet Propulsion Lab.; **Fu-Kuo Chang**, Stanford Univ.; **Victor Giurgiutiu**, Univ. of South Carolina; **Wolfgang Grill**, Univ. Leipzig (Germany); **Olivier Giraud**, ONERA (France); **Shivan Haran**, Arkansas State Univ.; **Sridhar Krishnaswamy**, Northwestern Univ.; **Francesco Lanza di Scalea**, Univ. of California/San Diego; **Jerome P. Lynch**, Univ. of Michigan; **Jennifer E. Michaels**, Georgia Institute of Technology; **Won-Bae Na**, Pukyong National Univ. (South Korea); **Paul D. Panetta**, Luna Innovations Inc.; **Perngjin Frank Pai**, Univ. of Missouri/Columbia; **Dominique Placko**, École Normale Supérieure de Cachan (France); **Hoon Sohn**, Korea Advanced Institute of Science and Technology (South Korea); **Michael D. Todd**, Univ. of California/San Diego; **Wei-Chih Wang**, Univ. of Washington; **Paul D. Wilcox**, Univ. of Bristol (United Kingdom); **Hwai-Chung Wu**, Wayne State Univ.; **Andrei N. Zagrai**, New Mexico Institute of Mining and Technology; **George Zentai**, Varian Medical Systems, Inc.

<p>Awards:8:15 to 8:30 am</p> <p>2009 SSM Lifetime Achievement Award Presented to Dr. Gordon Wallace, Wollongong Univ. (Australia)</p> <p>2009 NDE Lifetime Achievement Award Presented to Dr. R. Bruce Thompson, Ames Lab./NDE Ctr., Iowa State Univ. (United States)</p>	<p>Plenary Presentation:8:30 to 9:15 am</p> <p>Future Challenges in Aeronautics R&D Jaiwon Shin, Associate Administrator for the Aeronautics Research Mission Directorate, NASA (United States)</p> <p>Plenary Presentation:9:15 to 10:00 am</p> <p>Beyond PZT-Based Actuators: Bridging Material Science and Engineering Paolo Ermanni, ETH Zürich (Switzerland)</p> <p><i>Please see page 2 for more information.</i></p>
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Conference 7287

SESSION 1
Room: Pacific Salon I-III
Mon. 10:30 am to 12:00 pm

EAP as Emerging Actuators and Biomimetic Technologies
Session Chairs: Yoseph Bar-Cohen, Jet Propulsion Lab.; **Thomas Wallmersperger**, Univ. Stuttgart (Germany)

10:30 am: **The simulation of humans and lower animals** (*Keynote Paper*), Demetri Terzopoulos, Univ. of California, Los Angeles (United States) . [7287-01]



Demetri Terzopoulos is the Chancellor's Professor of Computer Science at the University of California, Los Angeles.
See more information on p. 4.

11:05 am: **Electroactive Polymer (EAP) actuators for future humanlike robots**, Yoseph Bar-Cohen, Jet Propulsion Lab. (United States) [7287-02]

11:20 am: **Hydrogel research in Germany: the priority programme, 'Intelligent Hydrogels'** (*Invited Paper*), Gabriele Sadowski, Technische Univ. Dortmund (Germany); Thomas Wallmersperger, Univ. Stuttgart (Germany) [7287-03]

11:45 am: **Organic Bionics** (*Invited Paper*), Gordon Wallace, Wollongong Univ. (Australia) . . . [7287-93]



Gordon Wallace is the 2009 SSM Lifetime Achievement Award winner.
See more information on p. 6.

Lunch Break 12:10 to 1:30 pm

Conference 7288

Sessions 1 and 4 run concurrently

<p>SESSION 1 Room: Sunrise Mon. 10:30 to 11:30 am</p> <p>Micro- and Nano- Systems <i>Session Chairs: Nakhiah C. S. Goulbourne</i>, Virginia Polytechnic Institute and State Univ.; Seyed Nima Mahmoodi, Virginia Polytechnic Institute and State Univ.</p> <p>10:30 am: Superelastic NiTi thin film small vessel graft for vascular repair, Young-Jae Chun, Daniel S. Levi, Kotekar P. Mohanchandra, Gregory P. Carman, Univ. of California, Los Angeles (United States) [7288-01]</p> <p>10:50 am: Altering the natural frequencies of simply supported piezoelectric membranes using negative capacitance circuits, Michael Fontaine, Miles A. Wickersham, Umesh A. Korde, South Dakota School of Mines and Technology (United States) [7288-03]</p> <p>11:10 am: Electrospinning synthesis and electrochemical properties of Li(Ni_{0.9}Co_{0.1})O₂ nanofibers of lithium battery cathode, Yanyi Liu, Minoru Taya, Chunye Xu, Univ. of Washington (United States) [7288-04]</p> <p>Lunch Break 11:30 am to 1:00 pm</p>	<p>SESSION 4 Room: Sunset Mon. 10:30 am to 12:10 pm</p> <p>Bio-inspired Systems <i>Session Chairs: Mohammad H. Elahinia</i>, The Univ. of Toledo</p> <p>10:30 am: Incorporation and characterization of biological molecules in droplet-interface bilayer networks for novel active systems, Stephen A. Sarles, Donald J. Leo, Virginia Polytechnic Institute and State Univ. (United States) [7288-15]</p> <p>10:50 am: Aerodynamic force generation of a compressed LIPCA-driven flapping device mimicking insect flight, Quoc Viet Nguyen, Hoon Cheol Park, Nam-Seo Goo, Doyoung Byun, Konkuk Univ. (Korea, Republic of) [7288-16]</p> <p>11:10 am: An improved fish robot driven by piezoceramic actuators, Sang Q. Nguyen, Cheon H. Park, Konkuk Univ. (Korea, Republic of) . . [7288-17]</p> <p>11:30 am: Dynamic behavior of LIPCA and the designs of four-bar linkage for mimicking insect flapping motion, Quang-Tri Truong, Quoc Viet Nguyen, Hoon Cheol Park, Doyoung Byun, Nam-Seo Goo, Konkuk Univ. (Korea, Republic of) . . [7288-19]</p> <p>11:50 am: BATMAV, a biologically inspired micro-air vehicle for flapping flight: artificial-muscle-based actuation, Gheorghe Bunget, Stefan S. Seelecke, North Carolina State Univ. (United States) [7288-20]</p> <p>Lunch Break 12:10 to 1:40 pm</p>
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Conference 7289

SESSION 1
Room: Pacific Salon IV-V
Mon. 10:30 to 11:50 am

Ferroelectric Ceramics I: Modeling the Hysteresis Behavior
Session Chairs: Ralph C. Smith, North Carolina State Univ.; **Stefan S. Seelecke**, North Carolina State Univ.

10:30 am: **Efficient algorithms for implementation and identification of hysteresis models**, Ralph C. Smith, Lisa Downen, North Carolina State Univ. (United States); Travious Glover, Albany State Univ. (United States); Lee Hallock, Univ. of Wisconsin, La Crosse (United States); Sarah King, North Carolina State Univ. (United States); Joel Shor, Princeton Univ. (United States); John Wallace, Virginia Polytechnic Institute and State Univ. (United States) . . [7289-01]

10:50 am: **Electro-mechanically coupled model of a polycrystalline piezoelectric stack actuator**, Alexander York, Stefan Seelecke, North Carolina State Univ. (United States) [7289-02]

11:10 am: **Efficient parameter estimation techniques for hysteresis models**, Jon M. Ernstberger, LaGrange College (United States); Ralph C. Smith, North Carolina State Univ. (United States) [7289-03]

11:30 am: **One-dimensional switching model for major and minor hysteresis loops in ferroelectric materials**, Tadashige Ikeda, Keigo Yoshida, Tetsuhiko Ueda, Nagoya Univ. (Japan) . . . [7289-04]

Lunch Break 11:50 am to 1:20 pm

Conference 7290

SESSION 1
Room: Royal Palm IV
Mon. 11:10 to 11:50 am

Vibration Damping and Actuator Applications
Session Chairs: Eric H. Anderson, CSA Engineering, Inc.; **Benjamin K. Henderson**, Air Force Research Lab.

11:10 am: **Smart printed circuit board (PCB) technology for high precision shock and vibration sensing**, Grace Kessenich, Baruch Pletner, Wesley Horth, IPTRADE Inc. (United States) [7290-02]

11:30 am: **Design and control of tilting actuator for endoscope**, Sung-Joo Kim, Chul-Jin Kim, Hyun-Woo Hwang, Hyun-Seok Yang, No-Cheol Park, Young-Pil Park, Yonsei Univ. (Korea, Republic of) . . . [7290-04]

Lunch Break 11:50 am to 1:10 pm

<p>Awards:8:15 to 8:30 am</p> <p>2009 SSM Lifetime Achievement Award Presented to Dr. Gordon Wallace, Wollongong Univ. (Australia)</p> <p>2009 NDE Lifetime Achievement Award Presented to Dr. R. Bruce Thompson, Ames Lab./NDE Ctr., Iowa State Univ. (United States)</p>	<p>Plenary Presentation:8:30 to 9:15 am</p> <p>Future Challenges in Aeronautics R&D Jaiwon Shin, Associate Administrator for the Aeronautics Research Mission Directorate, NASA (United States)</p> <p>Plenary Presentation:9:15 to 10:00 am</p> <p>Beyond PZT-Based Actuators: Bridging Material Science and Engineering Paolo Ermanni, ETH Zürich (Switzerland) <i>Please see page 2 for more information.</i></p>
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Conference 7291	Conference 7292	Conference 7293	Conference 7294	Conference 7295
<p>Room: Pacific Salon VI/VII Mon. 10:30 to 11:10 am</p> <p>Keynote Presentation <i>Session Chair: Vijay K. Varadan</i>, Univ. of Arkansas</p> <p>10:30 am: Nanobased chemical sensor array systems for unmanned ground and airborne vehicles, Paul B. Ruffin, U.S. Army Aviation and Missile Research, Development and Engineering Ctr. (United States); Christina L. Brantley, U.S. Army Research, Development and Engineering Command (United States); Eugene Edwards, U.S. Army Aviation and Missile Research, Development and Engineering Ctr. (United States) [7291-01]</p> <p>SESSION 1</p> <p>Room: Pacific Salon VI/VII Mon. 11:10 am to 12:10 pm</p> <p>Nanomaterials <i>Session Chair: Malathi Srivatsan</i>, Arkansas State Univ.</p> <p>11:10 am: Nanomaterials and structures for biomedical applications, Jining Xie, Linfeng Chen, Vijay K. Varadan, Univ. of Arkansas (United States) [7291-02]</p> <p>11:30 am: Europium doped Gd2O3 and FeCo nanoparticles for biomedical applications (<i>Invited Paper</i>), Aswini K. Pradhan, Norfolk State Univ. (United States) [7291-03]</p> <p>11:50 am: Giant negative thermal expansion in magnetic nanocrystals (<i>Invited Paper</i>), Xu-Guang Zheng, Saga Univ. (Japan) [7291-04]</p> <p>Lunch Break 12:10 to 1:30 pm</p>	<p>Room: Royal Palm I Mon. 10:30 to 10:40 am</p> <p>Opening Remarks <i>Session Chairs: Chung-Bang Yun</i>, Korea Advanced Institute of Science and Technology (Korea, Republic of); Victor Giurgiutiu, Univ. of South Carolina</p> <p>SESSION 1</p> <p>Room: Royal Palm I Mon. 10:40 am to 12:00 pm</p> <p>Keynote Session <i>Session Chairs: Chung-Bang Yun</i>, Korea Advanced Institute of Science and Technology (Korea, Republic of); Victor Giurgiutiu, Univ. of South Carolina</p> <p>10:40 am: Passive sensors for infrastructure monitoring, Sharon L. Wood, The Univ. of Texas at Austin (United States) [7292-01]</p> <p>11:20 am: Some principles of active sensing revealed by study of the rat whisker system (<i>Presentation Only</i>), Mitra J. Z. Hartmann, Northwestern Univ. (United States) [7292-02]</p> <p>Lunch Break 12:00 to 1:20 pm</p>	<p>SESSION 1</p> <p>Room: Royal Palm III Mon. 10:30 to 11:50 am</p> <p>Fiber Bragg Grating Sensors I <i>Session Chair: Wolfgang Ecke</i>, IPHT Jena (Germany)</p> <p>10:30 am: Calibration of Fiber Bragg gratings for optical sensing (FIBOS) for an aerospace application (<i>Invited Paper</i>), Raquel L. López Heredero, M. Frovel, H. Laguna, Tomás Belenguier-Dávila, Instituto Nacional de Técnica Aeroespacial (Spain) [7293-01]</p> <p>11:10 am: FBG spectral sensor networks for damage identification in composites, Adam Propst, Chun Park, Kara J. Peters, Mohammed A. Zikry, North Carolina State Univ. (United States) [7293-02]</p> <p>11:30 am: High sample rate full spectral interrogation of carbon fiber woven composite structures, Richard Selfridge, Wesley M. Kunzler, Greg Droge, Stephen M. Schultz, Brigham Young Univ. (United States); Kara Peters, Adam Propst, Mohammed Zikry, North Carolina State Univ. (United States) [7293-03]</p> <p>Lunch Break 11:50 am to 1:20 pm</p>	<p>SESSION 1</p> <p>Room: Royal Palm VI Mon. 10:30 to 11:50 am</p> <p>Acoustic-Ultrasound Characterization I <i>Session Chairs: Jerome P. Lynch</i>, Univ. of Michigan; Xiaoning Jiang, TRS Technologies, Inc.</p> <p>10:30 am: A 35 MHz PCMUT phased array for NDE ultrasound, Xiaoning Jiang, Kevin A. Snook, TRS Technologies, Inc. (United States); Changhong Hu, Univ. of Southern California (United States); Xuegang Geng, Ruibin Liu, Blatek, Inc. (United States); John Welter, Air Force Research Lab. (United States); Kirk Shung, Univ. of Southern California (United States); Wesley S. Hackenberger, TRS Technologies, Inc. (United States) [7294-01]</p> <p>10:50 am: Ultrasonic array speckle image correlation for internal strain and displacement measurement in metals, Adam I. Bowler, Paul D. Wilcox, Bruce W. Drinkwater, Univ. of Bristol (United Kingdom) [7294-02]</p> <p>11:10 am: Design considerations for the acoustic emission testing of large composite specimens, Jonathan J. Scholey, Paul D. Wilcox, Michael R. Wisnom, Michael I. Friswell, Univ. of Bristol (United Kingdom) [7294-03]</p> <p>11:30 am: Identification of subsurface damage in fiber-reinforced concrete using one sided wave measurements, Dimitrios G. Aggelis, Theodore E. Matikas, Univ. of Ioannina (Greece) [7294-04]</p> <p>Lunch Break 11:50 am to 1:00 pm</p>	<p>SESSION 1</p> <p>Room: Royal Palm V Mon. 10:30 to 11:50 am</p> <p>SHM for Aerospace Applications I: Complex Structures <i>Session Chairs: Tribikram Kundu</i>, The Univ. of Arizona; Wolfgang Grill, Univ. Leipzig (Germany)</p> <p>10:30 am: Comparison of surface acoustic wave and guided wave sensing in complex geometry aerospace structures, James L. Blackshire, Air Force Research Lab. (United States); Jeong K. Na, Samuel J. M. Kuhr, Univ. of Dayton Research Institute (United States) [7295-01]</p> <p>10:50 am: SHM in complex structural components, Anthony J. Croxford, Paul D. Wilcox, Charles R. P. Courtney, Bruce W. Drinkwater, Univ. of Bristol (United Kingdom) [7295-02]</p> <p>11:10 am: Sensitivity analysis of a transmission line model for damage characterization in complex structures, Dany Francoeur, Patrice Masson, Philippe Micheau, Univ. de Sherbrooke (Canada) [7295-03]</p> <p>11:30 am: NDE using sensor based approach to propulsion health monitoring, Ali Abdul-Aziz, Mark R. Woike, George Y. Baakilini, NASA Glenn Research Ctr. (United States) [7295-04]</p> <p>Lunch Break 11:50 am to 1:00 pm</p>

Conference 7287	Conference 7288	Conference 7289	Conference 7290	Conference 7291
<p>SESSION 2</p> <p>Room: Pacific Salon I-III Mon. 1:30 to 3:10 pm</p> <p>Biomimetics</p> <p><i>Session Chairs:</i> Iain A. Anderson, The Univ. of Auckland (New Zealand); Gabor M. Kovacs, EMPA (Switzerland)</p> <p>1:30 pm: FEA of dielectric elastomer minimum energy structures as a tool for biomimetic design, Benjamin M. O'Brien, Todd A. Gisby, Shane Xie, The Univ. of Auckland (New Zealand); Emilio P. Calius, Industrial Research Ltd. (New Zealand); Iain A. Anderson, The Univ. of Auckland (New Zealand). [7287-04]</p> <p>1:50 pm: Integrated sensing and actuation of muscle-like actuators, Todd A. Gisby, Shane Xie, The Univ. of Auckland (New Zealand); Emilio P. Calius, Industrial Research Ltd. (New Zealand); Iain A. Anderson, The Univ. of Auckland (New Zealand) [7287-05]</p> <p>2:10 pm: Artificial muscles powered by microbes, Ioannis Ieropoulos, Univ. of the West of England (United Kingdom); Iain A. Anderson, Todd A. Gisby, Cheng-Hung Wang, The Univ. of Auckland (New Zealand); Jonathan M. Rossiter, Univ. of Bristol (United Kingdom) [7287-06]</p> <p>2:30 pm: Silicone based skin for humanoids, Yonas T. Tadesse, David Moore, Nick D. Thayer, Shashank Priya, Virginia Polytechnic Institute and State Univ. (United States). [7287-07]</p> <p>2:50 pm: Contractive tension force stack actuator based on soft dielectric EAP (Invited Paper), Gabor M. Kovacs, Lukas Düring, EMPA (Switzerland) [7287-08]</p> <p>Coffee Break. 3:10 to 3:40 pm</p>	<p style="text-align: center;">Sessions 2 and 5 run concurrently</p> <div style="display: flex; justify-content: space-between;"> <div style="width: 48%;"> <p>SESSION 2</p> <p>Room: Sunrise Mon. 1:00 to 3:00 pm</p> <p>PZT Energy Harvesting I</p> <p><i>Session Chairs:</i> Alper Erturk, Virginia Polytechnic Institute and State Univ.; Roger Stanway, The Univ. of Sheffield (United Kingdom)</p> <p>1:00 pm: Generation of electrical energy using short piezoelectric cantilevers in flowing media, Norbert Schwesinger, Sebastian Pobering, Technische Univ. München (Germany). [7288-05]</p> <p>1:20 pm: Comparisons between parallel- and series-SSHI interfaces adopted by piezoelectric energy harvesting systems, Yi-Chung Shu, I-Ching Lien, National Taiwan Univ. (Taiwan). [7288-06]</p> <p>1:40 pm: Vibration analysis of Zigzag micro-springs for energy harvesting application, Mohammad A. Karami, Daniel J. Inman, Virginia Polytechnic Institute and State Univ. (United States) [7288-07]</p> <p>2:00 pm: Development and testing of a MEMS piezoelectric energy harvester, Changki Mo, Ryan N. Knight, William W. Clark, Univ. of Pittsburgh (United States) [7288-08]</p> <p>2:20 pm: Novel two-stage piezoelectric-based electrical energy generators for low and variable speed rotary machinery, Jahangir S. Rastegar, Richard T. Murray, Omnitek Partners, LLC (United States) [7288-09]</p> <p>2:40 pm: Design and fabrication of 3-D MEMS Energy Harvesting Device, HyunUk Kim, Chee-Sung Park, Shashank Priya, Virginia Polytechnic Institute and State Univ. (United States) [7288-95]</p> <p>Coffee Break. 3:00 to 3:30 pm</p> </div> <div style="width: 48%;"> <p>SESSION 5</p> <p>Room: Sunset Mon. 1:40 to 3:00 pm</p> <p>MR Systems I</p> <p><i>Session Chair:</i> Mehdi Ahmadian, Virginia Polytechnic Institute and State Univ.</p> <p>1:40 pm: Application of self-tuning Gaussian networks for control of civil structures equipped with magnetorheological dampers, Simon Laflamme, Jerome J. Connor, Massachusetts Institute of Technology (United States) [7288-21]</p> <p>2:00 pm: Optimal preview control of vehicle suspension system considering time delay of MR damper and quality of preview information, Jong-Sei Han, Min-Sang Seong, Seung-Bok Choi, Inha Univ. (Korea, Republic of) [7288-22]</p> <p>2:20 pm: Haptic cue device for accelerator pedal using magnetorheological fluids, Kyung-Wook Noh, Young-Min Han, Seung-Bok Choi, Inha Univ. (Korea, Republic of) [7288-23]</p> <p>2:40 pm: Nonlinear MR model inversion for semi-active control enhancement, Daniel M. Reader, Steve C. Southward, Mehdi Ahmadian, Virginia Polytechnic Institute and State Univ. (United States) [7288-96]</p> <p>Coffee Break. 3:00 to 3:30 pm</p> </div> </div>	<p>SESSION 2</p> <p>Room: Pacific Salon IV-V Mon. 1:00 to 3:00 pm</p> <p>Applications of Piezoelectric, Ferroelectric, and Multifunctional Materials</p> <p><i>Session Chairs:</i> Karla M. Mossi, Virginia Commonwealth Univ.; Gregory H. Huff, Texas A&M Univ.</p> <p>1:00 pm: Evaluating the fatigue response of piezoelectric stacks at humidity, Chia-Ming Chang, Univ. of California, Los Angeles (United States); Friedrich K. Straub, The Boeing Co. (United States); Gregory P. Carman, Univ. of California, Los Angeles (United States) [7289-05]</p> <p>1:20 pm: Harvesting energy through cyclic temperatures using the pyroelectric effect, Karla M. Mossi, Jingsi Xie, Poorna Mane, Virginia Commonwealth Univ. (United States); Kam K. Leang, Univ. of Nevada, Reno (United States) [7289-06]</p> <p>1:40 pm: PZT-ZrO₂ composites as piezo wafers for structural health monitoring, Amarnath Sen, Central Glass and Ceramic Research Institute (India) [7289-07]</p> <p>2:00 pm: Development of high-performance Pb(Zn₁/3Nb₂/3)O₃-PbTiO₃ single crystal actuators, Rahul Shukla, Indian Institute of Technology, Bombay (India) and National Univ. of Singapore (Singapore); Leong-Chew Lim, National Univ. of Singapore (Singapore) and Microfine Materials Technologies Pte. Ltd. (Singapore); Prasanna Gandhi, Indian Institute of Technology, Bombay (India) [7289-09]</p> <p>2:20 pm: Construction of compatible microstructures for tetragonal ferroelectric single crystals, Nien-Ti Tsou, John E. Huber, Univ. of Oxford (United Kingdom) [7289-08]</p> <p>2:40 pm: Dynamic compensation mechanisms for deformable radiating structures based on colloidal dielectrics and fluidics, Gregory H. Huff, Stephen A. Long, Texas A&M Univ. (United States) [7289-81]</p> <p>Coffee Break. 3:00 to 3:30 pm</p>	<p>SESSION 2</p> <p>Room: Royal Palm IV Mon. 1:30 to 2:50 pm</p> <p>Automotive Applications I</p> <p><i>Session Chairs:</i> Marcelo J. Dapino, The Ohio State Univ.; Nancy L. Johnson, General Motors Corp.</p> <p>1:30 pm: Effect of bending on the performance of spool-packaged shape memory alloy actuators, John A. Redmond, Diann E. Brei, Jonathan E. Luntz, Univ. of Michigan (United States); Alan L. Browne, General Motors Corp. (United States) [7290-06]</p> <p>1:50 pm: SMA wire actuator modular design tool, Brian M. Barnes, Diann E. Brei, Jonathan E. Luntz, Univ. of Michigan (United States) [7290-07]</p> <p>2:10 pm: Aluminum-matrix composites with embedded Ni-Ti wires by ultrasonic consolidation, Ryan M. Hahnlén, Marcelo J. Dapino, The Ohio State Univ. (United States); Karl Graff, Matt Short, Edison Welding Institute (United States) [7290-08]</p> <p>2:30 pm: Design and micro-fabrication of a PVDF acoustic sensor, Jian Xu, Marcelo J. Dapino, Daniel G. Perez, Derek Hansford, The Ohio State Univ. (United States) [7290-09]</p> <p>Coffee Break. 2:50 to 3:20 pm</p>	<p>Room: Pacific Salon VI/VII Mon. 1:30 to 2:10 pm</p> <p>Keynote Presentation</p> <p><i>Session Chair:</i> Vijay K. Varadan, Univ. of Arkansas</p> <p>1:30 pm: Wireless Nanosensors and Systems (WINS), Gail McClure, Arkansas Science and Technology (United States) [7291-05]</p> <p style="text-align: center;">SESSION 2</p> <p>Room: Pacific Salon VI/VII Mon. 2:10 to 3:10 pm</p> <p>Nanowire, Nanotubes, and Nanostructures</p> <p><i>Session Chair:</i> Ashok Srivastava, Louisiana State Univ.</p> <p>2:10 pm: New materials for old problems: what can nanomaterials do for biological and neuroscience, Malathi Srivatsan, Arkansas State Univ. (United States) [7291-06]</p> <p>2:30 pm: Magnetic nanomaterials and nanomedicine, Linfeng Chen, Jining Xie, Vijay K. Varadan, Univ. of Arkansas (United States) [7291-07]</p> <p>2:50 pm: Design and fabrication of nanowire electrodes on a flexible substrate for detection of myocardial ischemia, Vasuda Ramachandran, Hargsoon Yoon, Vijay K. Varadan, Univ. of Arkansas (United States) [7291-08]</p> <p>Coffee Break. 3:10 to 3:40 pm</p>

Conference 7292	Conference 7293	Conference 7294	Conference 7295	
Sessions 2 and 4 run concurrently				
<p style="text-align: center;">SESSION 2</p> <p style="text-align: center;">Room: Royal Palm I Mon. 1:20 to 3:00 pm</p> <p style="text-align: center;">Smart Materials and Systems I</p> <p style="text-align: center;"><i>Session Chairs: Ming L. Wang, Univ. of Illinois at Chicago; Rahmat A. Shoureshi, Univ. of Denver</i></p> <p>1:20 pm: In-situ damage detection using self-sensing composites, Shoab A. Malik, Liwei Wang, Surya D. Pandita, D. Harris, G. F. Fernando, The Univ. of Birmingham (United Kingdom) [7292-03]</p> <p>1:40 pm: Smart structures using shape memory alloys, Jamieson Clarke, Solomon Tesfamariam, Spiro Yannacopoulos, The Univ. of British Columbia (Canada)[7292-04]</p> <p>2:00 pm: Development of self-heating concrete using carbon nanofiber paper, Jianhua Feng, Harbin Institute of Technology (China) [7292-05]</p> <p>2:20 pm: Self-powered nervous system for smart structures, Rahmat A. Shoureshi, Univ. of Denver (United States) [7292-06]</p> <p>2:40 pm: Cement-based piezoelectric ceramic composite and its sensor applications in civil engineering, Biqin Dong, Shenzhen Univ. (China) . . [7292-07]</p> <p>Coffee Break. 3:00 to 3:30 pm</p>	<p style="text-align: center;">SESSION 4</p> <p style="text-align: center;">Room: Royal Palm II Mon. 1:20 to 3:00 pm</p> <p style="text-align: center;">Signal Processing and Damage Detection</p> <p style="text-align: center;"><i>Session Chairs: Lingyu Yu, Univ. of South Carolina; Bogdan I. Epureanu, Univ. of Michigan</i></p> <p>1:20 pm: Near real-time analysis of extrinsic Fabry-Perot interferometric sensors under damped vibration using artificial neural networks, Rohit Dua, New York Institute of Technology (United States); Steve E. Watkins, Missouri Univ. of Science and Technology (United States). [7292-15]</p> <p>1:40 pm: Image thresholding in the high-resolution target movement monitor, Deepti Bairineni, Randy H. Moss, Tristan H. Jones, Steve E. Watkins, Missouri Univ. of Science and Technology (United States); Derek B. Apel, Univ. of Alberta (Canada) [7292-16]</p> <p>2:00 pm: Interrogation of large structures using system augmentation and nonlinear feedback auxiliary signals, Kiran X. D'Souza, Bogdan I. Epureanu, Univ. of Michigan (United States) [7292-17]</p> <p>2:20 pm: Lamb waves decomposition using matching pursuit method, Buli Xu, Victor Giurgiutiu, Lingyu Yu, Univ. of South Carolina (United States) [7292-18]</p> <p>2:40 pm: Bayesian segmentation for SHM image with MRF prior, Gang Li, Fuh-Gwo Yuan, North Carolina State Univ. (United States); Raphael T. Haftka, Nam-Ho Kim, Univ. of Florida (United States) . . [7292-19]</p> <p>Coffee Break. 3:00 to 3:30 pm</p>	<p style="text-align: center;">SESSION 2</p> <p style="text-align: center;">Room: Royal Palm III Mon. 1:20 to 3:00 pm</p> <p style="text-align: center;">Fiber Bragg Grating Sensors II</p> <p style="text-align: center;"><i>Session Chair: Norbert G. Meyendorf, Fraunhofer-Institut für Zerstörungsfreie Prüfverfahren (Germany)</i></p> <p>1:20 pm: Demonstration of an embedded distributed fiber optic sensor (EDIFOS) system for monitoring the structural integrity and damage assessment of high-performance cable systems, Edgar A. Mendoza, Redondo Optics, Inc. (United States) [7293-04]</p> <p>1:40 pm: Temperature and humidity dependent performance of FBG-strain sensors embedded in carbon/epoxy composites, Malte Frövel, Gabriel Carrión, César Gutiérrez, Carolina Moravec, José María Pintado, Instituto Nacional de Técnica Aeroespacial (Spain) [7293-05]</p> <p>2:00 pm: Application of the embedded optical fiber Bragg grating sensors in curing monitoring of Gr/epoxy laminated composites, Liren Tsai, Tusng-Chieh Cheng, National Kaohsiung Univ. of Applied Sciences (Taiwan); Chih-Lang Lin, Central Taiwan Univ. of Science and Technology (Taiwan); Chia-Chin Chiang, National Kaohsiung Univ. of Applied Sciences (Taiwan) [7293-06]</p> <p>2:20 pm: A novel FBG-based of self-monitoring intrinsic smart steel tie rod, Zhi Zhou, Harbin Institute of Technology (China) [7293-07]</p> <p>2:40 pm: FBG sensor-based structural health monitoring in changing environmental and operational conditions, Zhishen Wu, N.H.M. Kamrujjaman Serker, Ibaraki Univ. (Japan) [7293-08]</p> <p>Coffee Break. 3:00 to 3:30 pm</p>	<p style="text-align: center;">SESSION 2</p> <p style="text-align: center;">Room: Royal Palm VI Mon. 1:00 to 3:00 pm</p> <p style="text-align: center;">Acoustic-Ultrasound Characterization II</p> <p style="text-align: center;"><i>Session Chairs: Jerome P. Lynch, Univ. of Michigan; Xiaoning Jiang, TRS Technologies, Inc.</i></p> <p>1:00 pm: Structural and acoustic emission behavior of steel-fiber reinforced concrete under bending, Dimitra V. Soulioti, Dimitrios G. Aggelis, Nektaria M. Barkoula, Alkis Paipetis, Theodore E. Matikas, Univ. of Ioannina (Greece); Tomoki Shiotani, Kyoto Univ. (Japan) [7294-05]</p> <p>1:20 pm: A practical approach for quantifying acoustic emission signals using diffuse field measurements, Jonathan J. Scholey, Paul D. Wilcox, Univ. of Bristol (United Kingdom) [7294-06]</p> <p>1:40 pm: Multi-stage fatigue life monitoring on quasi-isotropic carbon fibre reinforced polymers enhanced with multi-wall carbon nanotubes: parallel use of electrical resistance, acoustic emission, and acousto-ultrasonic techniques, V. Kostopoulos, A. Vavouliotis, T. Loutas, P. Karappapas, Univ. of Patras (Greece) [7294-07]</p> <p>2:00 pm: Acoustic emission monitoring during full scale wind turbine blade performance test, Dong-Jin Yoon, Sang-Il Lee, Young-Gil Kim, Yong-Hak Hur, Korea Research Institute of Standards and Science (Korea, Republic of) [7294-08]</p> <p>2:20 pm: FPGA based delay pulse circuit with 1-ns resolution, Hua Wang, Baohua Shan, Harbin Institute of Technology (China); JinPing Ou, Dalian Univ. of Technology (China) [7294-10]</p> <p>2:40 pm: Characterizing fatigue damage evolution of CFRP cables with acoustic emission technology, Dongsheng Li, JinPing Ou, Dalian Univ. of Technology (China) [7294-11]</p> <p>Coffee Break. 3:00 to 3:30 pm</p>	<p style="text-align: center;">SESSION 2</p> <p style="text-align: center;">Room: Royal Palm V Mon. 1:00 to 3:00 pm</p> <p style="text-align: center;">SHM for Aerospace Applications II: Sensor System Network and Related Issues</p> <p style="text-align: center;"><i>Session Chairs: Victor Giurgiutiu, Univ. of South Carolina; Jennifer E. Michaels, Georgia Institute of Technology</i></p> <p>1:00 pm: SmartComposite system for impact damage detection on composite structures, Xinlin P. Qing, Shawn J. Beard, Acellent Technologies, Inc. (United States); Jerome Pinsonnault, Bombardier Aerospace (Canada); Fu-Kuo Chang, Stanford Univ. (United States) [7295-09]</p> <p>1:20 pm: Neural network approach of active ultrasonic signals for structural health monitoring analysis, Zachary T. Kral, Walter J. Horn, James E. Steck, Wichita State Univ. (United States) [7295-10]</p> <p>1:40 pm: Ultrasonic assessment of satellite structural components and joints, Andrei N. Zagrai, New Mexico Institute of Mining and Technology (United States); Derek T. Doyle, New Mexico Institute of Mining and Technology (United States) and Air Force Research Lab. (United States); Timothy A. Barnes, New Mexico Institute of Mining and Technology (United States); Brandon J. Arritt, Air Force Research Lab. (United States) [7295-11]</p> <p>2:00 pm: Modeling of energy transmission by piezoelectric wafer active sensors through Gaussian contact, Sourav Banerjee, Tribikram Kundu, The Univ. of Arizona (United States) [7295-12]</p> <p>2:20 pm: Modeling SHM system performance over time, Jeffrey Kuhn, Air Force Institute of Technology (United States) [7295-13]</p> <p>2:40 pm: Applications for high speed fibre optic interrogator for health monitoring of aircraft structures, Thomas van Els, Technobis Fibre Technologies (Netherlands) [7295-110]</p> <p>Coffee Break. 3:00 to 3:30 pm</p>

Conference 7287	Conference 7288	Conference 7289	Conference 7290	Conference 7291		
<p>Room: Pacific Salon I-III Mon. 4:30 to 5:45 pm</p> <p>EAP-in-Action Demonstration <i>Panel Moderator: Yoseph Bar-Cohen, Jet Propulsion Lab.</i></p> <p>Facial expression-driven system using dielectric elastomer actuator, Jinsong Leng, Harbin Institute of Technology (China)</p> <p>The performance of PolyPower DEAP, Hans-Erik Kiiil, Michael Tryson, Danfoss PolyPower A/S, Nordborg (Denmark)</p> <p>Hydrostatically coupled dielectric elastomer actuators, Federico Carpi, Univ. of Pisa (Italy)</p> <p>EPAM-based energy harvester, Mikio Waki, Hyper Drive Corp. (Japan); Roy Korbbluh, Philip von Guggenberg, Seiki Chiba, SRI International</p> <p>Dielectric elastomer (DE) EAP, Iain Anderson, Emilio Calius, Todd Gisby, Ben O'Brien, Thomas McKay and Scott Walbran, The Auckland Bioengineering Institute (New Zealand)</p> <p>Contractive tension force stack actuator based on soft dielectric EAP, Gabor Kovacs, EMPA Dübendorf (Switzerland)</p> <p>Devices based on the AMI SmartMOVE actuator technology including diaphragm pumps, valves, and haptic displays, Marcus Rosenthal, Al Zarrabi, Peter Gise, Artificial Muscle, Inc., (United States)</p> <p>Contractile electroactive polymeric materials, Lenore Rasmussen, Ras Labs, LLC (United States)</p>	<p style="text-align: center; background-color: black; color: white; padding: 2px;">Sessions 3 and 6 run concurrently</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; vertical-align: top; padding: 5px;"> <p style="text-align: center;">SESSION 3</p> <p style="text-align: center;">Room: Sunrise Mon. 3:30 to 5:10 pm</p> <p style="text-align: center;">PZT Energy Harvesting II <i>Session Chairs: Gyuhae Park, Los Alamos National Lab.; Henry A. Sodano, Arizona State Univ.</i></p> <p>3:30 pm: Piezoelectric energy harvesting from multifunctional wing spars for UAVs: Part 1. Coupled modeling and preliminary analysis, Alper Erturk, Steven R. Anton, Daniel J. Inman, Virginia Polytechnic Institute and State Univ. (United States) [7288-10]</p> <p>3:50 pm: Piezoelectric energy harvesting from multifunctional wing spars for UAVs: Part 2. Experiments and storage applications, Steven R. Anton, Alper Erturk, Daniel J. Inman, Virginia Polytechnic Institute and State Univ. (United States) [7288-11]</p> <p>4:10 pm: Novel two-stage piezoelectric-based ocean wave energy harvesters for moored or unmoored buoys, Richard T. Murray, Jahangir S. Rastegar, Omnitek Partners, LLC (United States) [7288-12]</p> <p>4:30 pm: Development of an innovative energy harvesting device using MFC Bimorphs, Majid Tabesh, The M. Nguyen, Amin Mohaghegh Motlagh, Mohammad H. Elahinia, The Univ. of Toledo (United States) [7288-13]</p> <p>4:50 pm: Piezoelectric resonance shifting using tunable nonlinear stiffness, Timothy Reissman, Ephraim Garcia, Cornell Univ. (United States) [7288-14]</p> </td> <td style="width: 50%; vertical-align: top; padding: 5px;"> <p style="text-align: center;">SESSION 6</p> <p style="text-align: center;">Room: Sunset Mon. 3:30 to 5:30 pm</p> <p style="text-align: center;">MR Systems II <i>Session Chair: Faramarz Gordaninejad, Univ. of Nevada, Reno</i></p> <p>3:30 pm: Design and performance analysis of a squeeze-mode MR mount, Mehdi Ahmadian, Brian Southern, Virginia Polytechnic Institute and State Univ. (United States) [7288-24]</p> <p>3:50 pm: Rheometer characterization of MR fluids in squeeze mode, Mehdi Ahmadian, Alireza Farjoud, Ryan Cavey, Virginia Polytechnic Institute and State Univ. (United States) [7288-25]</p> <p>4:10 pm: Experimental evaluation of shear modulus of magneto-rheological elastomers based on natural rubber, Ji-Hyun Yoon, Jae-Eung Oh, Hanyang Univ. (Korea, Republic of); Kyu-Seo Yoon, Kyung-Ho Chung, The Univ. of Suwon (Korea, Republic of) [7288-26]</p> <p>4:30 pm: Performance robustness of a magnetorheological seat suspension to temperature variations using skyhook control, Nicholas L. Wilson, Norman M. Wereley, Wei Hu, Univ. of Maryland, College Park (United States); Gregory J. Hiemenz, Techno Sciences, Inc. (United States) [7288-27]</p> <p>4:50 pm: Enhancing the properties of magnetorheological fluids with ionic liquids, Carlos Guerrero Sanchez, Technische Univ. Eindhoven (Netherlands); Ulrich S. Schubert, Friedrich-Schiller-Univ. Jena (Germany) [7288-28]</p> <p>5:10 pm: The intelligent seismic retrofitting of structure based on the magnetorheological damper, Xiu-Ling Li, Sr., Hong-Nan Li, Dalian Univ. of Technology (China) [7288-29]</p> </td> </tr> </table>	<p style="text-align: center;">SESSION 3</p> <p style="text-align: center;">Room: Sunrise Mon. 3:30 to 5:10 pm</p> <p style="text-align: center;">PZT Energy Harvesting II <i>Session Chairs: Gyuhae Park, Los Alamos National Lab.; Henry A. Sodano, Arizona State Univ.</i></p> <p>3:30 pm: Piezoelectric energy harvesting from multifunctional wing spars for UAVs: Part 1. Coupled modeling and preliminary analysis, Alper Erturk, Steven R. Anton, Daniel J. Inman, Virginia Polytechnic Institute and State Univ. (United States) [7288-10]</p> <p>3:50 pm: Piezoelectric energy harvesting from multifunctional wing spars for UAVs: Part 2. Experiments and storage applications, Steven R. Anton, Alper Erturk, Daniel J. Inman, Virginia Polytechnic Institute and State Univ. 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Jena (Germany) [7288-28]</p> <p>5:10 pm: The intelligent seismic retrofitting of structure based on the magnetorheological damper, Xiu-Ling Li, Sr., Hong-Nan Li, Dalian Univ. of Technology (China) [7288-29]</p>	<p style="text-align: center;">SESSION 3</p> <p style="text-align: center;">Room: Pacific Salon IV-V Mon. 3:30 to 5:50 pm</p> <p style="text-align: center;">Ferroelectric Ceramics II: Modeling of Ferroelectric and Piezoelectric Ceramics <i>Session Chairs: Christopher L. Lynch, PerkinElmer Life and Analytical Sciences, Inc.; Marc Kamlah, Forschungszentrum Karlsruhe GmbH (Germany)</i></p> <p>3:30 pm: Computational phase-field modeling of defect interactions in ferroelectrics, Chad M. Landis, The Univ. of Texas at Austin (United States) [7289-10]</p> <p>3:50 pm: Parameter identification for phasefield models for ferroelectrics, Benjamin Voelker, Marc Kamlah, Forschungszentrum Karlsruhe GmbH (Germany) [7289-11]</p> <p>4:10 pm: A finite element formulation for piezoelectric shells with well balanced approximation functions, Sven O. Klinkel, Dieter Legner, Univ. Karlsruhe (Germany) [7289-12]</p> <p>4:30 pm: Surface and size effect in nano-scale ferroelectric films and wires, Fang Daining, Tsinghua Univ. (China) [7289-13]</p> <p>4:50 pm: 3-D ferroelectric phase field modeling, Christopher S. Lynch, Univ. of California, Los Angeles (United States)[7289-14]</p> <p>5:10 pm: Three dimensional finite element phasefield modeling for ferroelectrics, Jie Wang, Marc Kamlah, Forschungszentrum Karlsruhe GmbH (Germany) [7289-15]</p> <p>5:30 pm: A constitutive model for temperature dependent behavior of ferroelectric materials, Keigo Yoshida, Tadashige Ikeda, Tetsuhiko Ueda, Nagoya Univ. (Japan) [7289-16]</p>	<p style="text-align: center;">SESSION 3</p> <p style="text-align: center;">Room: Royal Palm IV Mon. 3:20 to 5:20 pm</p> <p style="text-align: center;">Automotive Applications II <i>Session Chairs: Diann E. Brei, Univ. of Michigan; Alan L. Browne, General Motors Corp.</i></p> <p>3:20 pm: Magnetorheological dampers for mountain bikes, David C. Batterbee, Neil D. Sims, The Univ. of Sheffield (United Kingdom) [7290-10]</p> <p>3:40 pm: A reversibly deployable air dam: a bending approach based on embedded shape memory alloy actuators: Part II. Technology demonstration, Alan L. Browne, Nancy L. Johnson, General Motors Corp. (United States); Geoffrey P. McKnight, HRL Labs., LLC (United States) [7290-11]</p> <p>4:00 pm: Design and modeling of a hydraulically amplified magnetostrictive actuator for automotive engine mounts, Suryarghya Chakrabarti, Marcelo J. Dapino, The Ohio State Univ. (United States)[7290-12]</p> <p>4:20 pm: Thermoelectric power generation for hybrid-electric vehicle auxiliary power, Leon M. Headings, Shawn Midlam-Mohler, Gregory N. Washington, Joseph P. Heremans, The Ohio State Univ. (United States)[7290-13]</p> <p>4:40 pm: Distributed wireless sensor for smart car seats, Amr M. Baz, Jason Smoker, Univ. of Maryland, College Park (United States) [7290-14]</p> <p>5:00 pm: Active friction control using ultrasonic vibrations, Shravan Bharadwaj, Marcelo J. Dapino, The Ohio State Univ. (United States) [7290-15]</p>	<p style="text-align: center;">SESSION 3</p> <p style="text-align: center;">Room: Pacific Salon VI/VII Mon. 3:40 to 5:20 pm</p> <p style="text-align: center;">Nano Devices I <i>Session Chairs: Jaehwan Kim, Inha Univ. (Korea, Republic of); Hargsoon Yoon, Univ. of Arkansas</i></p> <p>3:40 pm: Nanodevices for biosensing applications, Hargsoon Yoon, Devesh C. Deshpande, Vasuda Ramachandran, Philip T. Hankins, Vijay K. Varadan, Univ. of Arkansas (United States) [7291-09]</p> <p>4:00 pm: Implantable blood pressure sensor for analyzing elasticity in arteries, Marco Franco-Ayala, Fernando Martinez-Piñon, Jose A. Alvarez-Chavez, Ctr. de Investigación e Innovación Tecnológica (Mexico) [7291-10]</p> <p>4:20 pm: Nanomonitors: nanoporous membrane based "lab-on-a-chip" devices toward clinical diagnostics, Manish Bothara, Vinu L. Venkataraman, Ravikiran K. Reddy, Portland State Univ. (United States); Thomas Barrett, Oregon Health & Science Univ. (United States); John Carruthers, Portland State Univ. (United States); Shalini Prasad, Arizona State Univ. (United States) and Portland State Univ. (United States) [7291-11]</p> <p>4:40 pm: Droplet interface bilayer characteristics formed over synthetic porous substrates, M. Austin Creasy, Donald J. Leo, Virginia Polytechnic Institute and State Univ. (United States) [7291-12]</p> <p>5:00 pm: High-quality factor-integrated passive devices for microwave and millimeter wave applications, Tauno Vaha-Heikkila, VTT Technical Research Ctr. of Finland (Finland) [7291-13]</p>
<p style="text-align: center;">SESSION 3</p> <p style="text-align: center;">Room: Sunrise Mon. 3:30 to 5:10 pm</p> <p style="text-align: center;">PZT Energy Harvesting II <i>Session Chairs: Gyuhae Park, Los Alamos National Lab.; Henry A. Sodano, Arizona State Univ.</i></p> <p>3:30 pm: Piezoelectric energy harvesting from multifunctional wing spars for UAVs: Part 1. Coupled modeling and preliminary analysis, Alper Erturk, Steven R. Anton, Daniel J. Inman, Virginia Polytechnic Institute and State Univ. (United States) [7288-10]</p> <p>3:50 pm: Piezoelectric energy harvesting from multifunctional wing spars for UAVs: Part 2. Experiments and storage applications, Steven R. Anton, Alper Erturk, Daniel J. Inman, Virginia Polytechnic Institute and State Univ. (United States) [7288-11]</p> <p>4:10 pm: Novel two-stage piezoelectric-based ocean wave energy harvesters for moored or unmoored buoys, Richard T. Murray, Jahangir S. Rastegar, Omnitek Partners, LLC (United States) [7288-12]</p> <p>4:30 pm: Development of an innovative energy harvesting device using MFC Bimorphs, Majid Tabesh, The M. Nguyen, Amin Mohaghegh Motlagh, Mohammad H. Elahinia, The Univ. of Toledo (United States) [7288-13]</p> <p>4:50 pm: Piezoelectric resonance shifting using tunable nonlinear stiffness, Timothy Reissman, Ephraim Garcia, Cornell Univ. (United States) [7288-14]</p>	<p style="text-align: center;">SESSION 6</p> <p style="text-align: center;">Room: Sunset Mon. 3:30 to 5:30 pm</p> <p style="text-align: center;">MR Systems II <i>Session Chair: Faramarz Gordaninejad, Univ. of Nevada, Reno</i></p> <p>3:30 pm: Design and performance analysis of a squeeze-mode MR mount, Mehdi Ahmadian, Brian Southern, Virginia Polytechnic Institute and State Univ. (United States) [7288-24]</p> <p>3:50 pm: Rheometer characterization of MR fluids in squeeze mode, Mehdi Ahmadian, Alireza Farjoud, Ryan Cavey, Virginia Polytechnic Institute and State Univ. (United States) [7288-25]</p> <p>4:10 pm: Experimental evaluation of shear modulus of magneto-rheological elastomers based on natural rubber, Ji-Hyun Yoon, Jae-Eung Oh, Hanyang Univ. (Korea, Republic of); Kyu-Seo Yoon, Kyung-Ho Chung, The Univ. of Suwon (Korea, Republic of) [7288-26]</p> <p>4:30 pm: Performance robustness of a magnetorheological seat suspension to temperature variations using skyhook control, Nicholas L. Wilson, Norman M. Wereley, Wei Hu, Univ. of Maryland, College Park (United States); Gregory J. Hiemenz, Techno Sciences, Inc. (United States) [7288-27]</p> <p>4:50 pm: Enhancing the properties of magnetorheological fluids with ionic liquids, Carlos Guerrero Sanchez, Technische Univ. Eindhoven (Netherlands); Ulrich S. Schubert, Friedrich-Schiller-Univ. Jena (Germany) [7288-28]</p> <p>5:10 pm: The intelligent seismic retrofitting of structure based on the magnetorheological damper, Xiu-Ling Li, Sr., Hong-Nan Li, Dalian Univ. of Technology (China) [7288-29]</p>					

Conference 7292	Conference 7293	Conference 7294	Conference 7295	
Sessions 3 and 5 run concurrently				
<p style="text-align: center;">SESSION 3</p> <p style="text-align: center;">Room: Royal Palm I Mon. 3:30 to 5:50 pm</p> <p style="text-align: center;">Wireless Sensors and Networks I</p> <p style="text-align: center;"><i>Session Chairs: Ser-Tong Quek, National Univ. of Singapore (Singapore); Seunghee Park, Sungkyunkwan Univ. (Korea, Republic of)</i></p> <p>3:30 pm: Wireless sensor networks for a wooden tower health monitoring. Hongwei Li, Jinping Ou, Harbin Institute of Technology (China). [7292-08]</p> <p>3:50 pm: Structural damage detection using wireless sensors with data loss. Viet-Anh Tran, Ser-Tong Quek, Xiaoyan Hou, Wenhui Duan, National Univ. of Singapore (Singapore) [7292-09]</p> <p>4:10 pm: Wireless sensor self-diagnosis for piezoelectric actuating/sensing networks. Seunghee Park, Sungkyunkwan Univ. (Korea, Republic of); Hyunho Shin, Chung-Bang Yun, Korea Advanced Institute of Science and Technology (Korea, Republic of) [7292-10]</p> <p>4:30 pm: Wireless acquisition and transmission system of smart cement-based sensors. Yan Yu, Dalian Univ. of Technology (China); Baoguo H. Han, Harbin Institute of Technology (China); Jinping Ou, Dalian Univ. of Technology (China)[7292-11]</p> <p>4:50 pm: An unpowered wireless sensor measuring forces in steel tendons and reinforcing bars. Jialai Wang, Shixin Zeng, The Univ. of Alabama at Tuscaloosa (United States) [7292-12]</p> <p>5:10 pm: Wireless sensing using piezoceramic transducers for structural health monitoring. Yaowen Yang, Hui Liu, Nanyang Technological Univ. (Singapore); Venu G. M. Annamdas, Univ. of Pittsburgh (United States) [7292-13]</p> <p>5:30 pm: A low-cost wireless system for autonomous generation of road safety alerts. Bentley O. Banks, Tyler V. Harms, Sahara Sedigh Sarvestani, Filippo Bastianini, Missouri Univ. of Science and Technology (United States) [7292-14]</p>	<p style="text-align: center;">SESSION 5</p> <p style="text-align: center;">Room: Royal Palm II Mon. 3:30 to 5:30 pm</p> <p style="text-align: center;">Ultrasonics for SHM</p> <p style="text-align: center;"><i>Session Chairs: Akira Mita, Keio Univ. (Japan); Hoon Sohn, Carnegie Mellon Univ.</i></p> <p>3:30 pm: Impact detection using ultrasonic waves based on artificial immune system. Keisuke Okamoto, Akira Mita, Keio Univ. (Japan) [7292-20]</p> <p>3:50 pm: Defect detection in stiffened plate structures using coupled Rayleigh-like waves. Paul Fromme, Univ. College London (United Kingdom) [7292-21]</p> <p>4:10 pm: Lamb wave tuning curve calibration with improved PZT modeling. Sang Jun Lee, Carnegie Mellon Univ. (United States); Hoon Sohn, Korea Advanced Institute of Science and Technology (Korea, Republic of) [7292-22]</p> <p>4:30 pm: Analysis of lamb wave propagation on a plate using the spectral element method. Hyun Woo Park, Ki Lyong Lim, Eun Jin Kim, Dong-A Univ. (Korea, Republic of); Hoon Sohn, Korea Advanced Institute of Science and Technology (Korea, Republic of) [7292-23]</p> <p>4:50 pm: Torsional waves in clad cores. Weiliang Kong, Li Zhou, Nanjing Univ. of Aeronautics and Astronautics (China); Fuh-Gwo Yuan, North Carolina State Univ. (United States) [7292-24]</p> <p>5:10 pm: Coupling of highly nonlinear waves with linear elastic media. Devvrath Khatri, Chiara Daraio, California Institute of Technology (United States); Piervincenzo Rizzo, Univ. of Pittsburgh (United States) [7292-25]</p>	<p style="text-align: center;">SESSION 3</p> <p style="text-align: center;">Room: Royal Palm III Mon. 3:30 to 5:30 pm</p> <p style="text-align: center;">Fiber Bragg Grating Sensor Applications</p> <p style="text-align: center;"><i>Session Chair: Richard Selfridge, Brigham Young Univ.</i></p> <p>3:30 pm: Fiber Bragg grating optochemical sensor basing on evanescent-field interaction with surface plasmon waves. Wolfgang Ecke, Kerstin Schröder, IPHT Jena (Germany). [7293-09]</p> <p>3:50 pm: Direct fabrication of periodic metallic films on Fiber Bragg gratings for sensitivity enhancement. Seyed Hamidreza Alemohammad, Ehsan Toyserkani, Univ. of Waterloo (Canada) [7293-10]</p> <p>4:10 pm: A novel multifunctional fiber optic sensor. Ramani S. Mahendran, Venkata R. Machavaram, Liwei Wang, Stephen N. Kukureka, Gerard F. Fernando, The Univ. of Birmingham (United Kingdom) [7293-11]</p> <p>4:30 pm: Reconstruction of temperature and displacement fields in satellite sandwich panels based on integrated fiber optic sensors. Stephan Rapp, Horst J. Baier, Technische Univ. München (Germany) [7293-12]</p> <p>4:50 pm: Time-division multiplexing of FBG sensor system. Yongbo Dai, Gang Deng, Yanju Liu, Jingsong Leng, Harbin Institute of Technology (China). . [7293-13]</p> <p>5:10 pm: Research and development of POF-based smart transparent concrete. Zhi Zhou, Harbin Institute of Technology (China) [7293-14]</p>	<p style="text-align: center;">SESSION 3</p> <p style="text-align: center;">Room: Royal Palm VI Mon. 3:30 to 5:50 pm</p> <p style="text-align: center;">Damage Characterization in Composites</p> <p style="text-align: center;"><i>Session Chairs: Masoud Ghandehari, New York Univ. Polytechnic Institute; Fu-Kuo Chang, Stanford Univ.</i></p> <p>3:30 pm: Characterization of impact damage in woven fiber composites via sensing and NDE. Cristobal Hiche, Kuang C. Liu, Aditi Chattopadhyay, Arizona State Univ. (United States). [7294-12]</p> <p>3:50 pm: Characterization of interphase environmental degradation at elevated temperature of fiber-reinforced titanium matrix composites. Theodore E. Matikas, Univ. of Ioannina (Greece) [7294-13]</p> <p>4:10 pm: Nonlinear damage identification using scale-subwave fractal dimension feature of dynamic responses. Maosen Cao, Pizhong Qiao, Washington State Univ. (United States) [7294-14]</p> <p>4:30 pm: Fast inverse identification of delamination of E-glass/epoxy laminate composite panels. Gun-Jin Yun, Shen Shang, Univ. of Akron (United States); Pizhong Qiao, Washington State Univ. (United States) [7294-15]</p> <p>4:50 pm: Damage severity estimate for sandwich panels with lattice core using substructure potential energy. Hui Fang, T. J. Wang, Xi'an Jiaotong Univ. (China) [7294-16]</p> <p>5:10 pm: Mechanical analysis of forming defect of refractory alloy honeycomb sandwich. Xianghao Kong, Liping Shi, Xiaodong He, Harbin Institute of Technology (China) [7294-17]</p> <p>5:30 pm: The effective mechanical properties and the interfacial characterization of CNT reinforced nanocomposites. Hossein Sadeghi, Reza Naghdabadi, Sharif Univ. of Technology (Iran, Islamic Republic of) [7294-18]</p>	<p style="text-align: center;">SESSION 3</p> <p style="text-align: center;">Room: Royal Palm V Mon. 3:30 to 5:30 pm</p> <p style="text-align: center;">SHM for Aerospace Applications III: Damage Detection by Optical and Ultrasonic Techniques</p> <p style="text-align: center;"><i>Session Chairs: Michael D. Todd, Univ. of California, San Diego; Douglas E. Adams, Purdue Univ.</i></p> <p>3:30 pm: Characterization and birefringence effect on embedded optical fiber Bragg gratings. Michael C. Emmons, Kotekar P. Mohanchandra, Univ. of California, Los Angeles (United States); W. Lance Richards, NASA Dryden Flight Research Ctr. (United States); Gregory P. Carman, Univ. of California, Los Angeles (United States) [7295-19]</p> <p>3:50 pm: Curvature methods of damage detection using digital image correlation. Mark Helfrick, Christopher Niezrecki, Peter Avitabile, Univ. of Massachusetts Lowell (United States) [7295-20]</p> <p>4:10 pm: Fibre optic techniques for primary structural components health monitoring. Paolo Bettini, Alessandro Airoldi, Giuseppe Sala, Politecnico di Milano (Italy) [7295-21]</p> <p>4:30 pm: Active sensing of nonlinear fatigue damage using embedded ultrasonics. Andrei N. Zagral, Walter A. Kruse, New Mexico Institute of Mining and Technology (United States) [7295-22]</p> <p>4:50 pm: Detection of surface breaking fatigue cracks on a complex aircraft structure with Rayleigh surface waves. Jeong K. Na, Univ. of Dayton Research Institute (United States) [7295-23]</p> <p>5:10 pm: Dynamics based damage detection in composite structures. Saavik Banerjee, Indian Institute of Technology, Bombay (India); Fabrizio Ricci, Univ. degli Studi di Napoli Federico II (Italy); Harsh K. Baid, Ajit K. Mal, Univ. of California, Los Angeles (United States) [7295-24]</p>

Smart Structures Product Implementation
Award presentation 8:00 to 8:05 am

NIST Funding Agency Talk 8:05 to 8:20 am

Current and Future Programs and Initiatives
H. Felix Wu, National Institute of Standards and Technology
 (United States)

Plenary Presentation 8:20 to 9:05 am

Energy Harvesting: Small Scale Energy Production from Ambient Sources
Eric M. Yeatman, Imperial College London (United Kingdom)
Please see page 3 for more information.

Conference 7287

Conference 7288

Conference 7289

Conference 7290

Conference 7291

SESSION 4

Room: Pacific Salon I-III
Tues. 9:00 am to 12:10 pm

Electronic EAP

Session Chairs: **Barbar J. Akle**, Lebanese American Univ. (Lebanon); **Thomas Wallmersperger**, Univ. Stuttgart (Germany)

9:10 am: **Electromechanical instability in dielectric elastomers** (*Invited Paper*), Zhigang Suo, Harvard Univ. (United States) [7287-09]

9:40 am: **Ion-implanted compliant electrodes for mm-size dielectric elastomer actuators**, Samuel Rosset, Muhamed Niklaus, Philippe Dubois, Herbert R. Shea, Ecole Polytechnique Fédérale de Lausanne (Switzerland) [7287-10]
 Coffee Break. 10:00 to 10:30 am

Sessions 7 and 11 run concurrently

SESSION 7

Room: Sunrise
Tues. 9:10 to 10:10 am

Energy Harvesting I

Session Chairs: **Henry A. Sodano**, Arizona State Univ.; **Gyuhae Park**, Los Alamos National Lab.

9:10 am: **On structural effects and energy conversion efficiency of power harvesting**, Yabin Liao, Henry A. Sodano, Arizona State Univ. (United States). [7288-30]

9:30 am: **An advanced power management and energy storage system for energy harvesting**, Charles Lakeman, Patrick Fleig, Tim Trainor, TPL, Inc. (United States) [7288-31]

9:50 am: **Evaluation of flexible transducers for motion energy harvesting**, Michael Collins, Sam Behrens, Scott McGarry, Commonwealth Scientific and Industrial Research Organisation (Australia)[7288-32]
 Coffee Break. 10:10 to 10:40 am

SESSION 11

Room: Sunset
Tues. 9:10 to 10:10 am

MR Systems III

Session Chairs: **Norman M. Wereley**, Univ. of Maryland, College Park; **Alireza Farjoud**, Virginia Polytechnic Institute and State Univ.

9:10 am: **Analytical modeling and experimental validation of a magnetorheological mount**, The M. Nguyen, The Univ. of Toledo (United States); Constantin Ciocanel, Northern Arizona Univ. (United States); Mohammad H. Elahinia, The Univ. of Toledo (United States) . [7288-48]

9:30 am: **Semi-active unbalance compensation in an asymmetrical rotor-bearing system using a suspension with MR dampers**, Manuel Arias-Montiel, Alvaro Cabrera-Amado, Gerardo Silva-Navarro, Ctr. de Investigación y de Estudios Avanzados (Mexico) [7288-49]

9:50 am: **Effect of temperature on the shear yield stress of magneto-rheological grease**, Huseyin Sahin, Xiaojie Wang, Faramarz Gordaninejad, Univ. of Nevada, Reno (United States) [7288-50]
 Coffee Break. 10:10 to 10:40 am

SESSION 4

Room: Pacific Salon IV-V
Tues. 9:10 am to 12:00 pm

Shape Memory Materials I: Shape Memory Alloys

Session Chair: **Ibrahim Karaman**, Texas A&M Univ.

9:10 am: **Pseudo-creep in Cu-Al-Ni single crystal shape memory alloys**, Ganesh K. Kannarpady, Abhijit Bhattacharyya, Univ. of Arkansas at Little Rock (United States) [7289-20]

9:30 am: **Experimental investigation and 3-D modeling of rate-dependent and rate-independent irrecoverable deformation in shape memory alloys**, Darren J. Hartl, George Chatzigeorgiou, Dimitris C. Lagoudas, Texas A&M Univ. (United States) [7289-18]

9:50 am: **Local deformation behavior arising in NiTi plate and its influence on macroscopic deformation behavior**, Go Murasawa, Yamagata Univ. (Japan); Kazuhiro Kitamura, Nagano National College of Technology (Japan); Shuichi Miyazaki, Univ. of Tsukuba (Japan); Akihiro Nishioka, Ken Miyata, Tomonori Koda, Yamagata Univ. (Japan) [7289-19]
 Coffee Break. 10:10 to 10:40 am

SESSION 4

Room: Royal Palm IV
Tues. 9:10 to 9:50 am

Aerospace Applications

Session Chair: **M. Brett McMickell**, Honeywell International Inc.

9:10 am: **Miniature piezoelectric shaker mechanism for autonomous distribution of unconsolidated sample to instrument cells**, Stewart Sherrit, Kent Frankovich, Xiaoqi Bao, Curtis Tucker, Jet Propulsion Lab. (United States) [7290-16]

9:30 am: **EMCH flight experiment, results, and commercialization** (*Invited Paper*), Rory Barrett, Composite Technology Development, Inc. (United States)[7290-17]
 Coffee Break. 9:50 to 10:20 am

Room: Pacific Salon VI/VII
Tues. 9:10 to 9:40 am

Keynote Presentation

Session Chair: **Vijay K. Varadan**, Univ. of Arkansas

9:10 am: **Renewable energy using plasmonics as a front end for solar cells**, Vasundara V. Varadan, Univ. of Arkansas (United States) [7291-14]

SESSION 4

Room: Pacific Salon VI/VII
Tues. 9:40 to 10:00 am

Nano Devices II

Session Chair: **Vijay K. Varadan**, Univ. of Arkansas

9:40 am: **Wireless integration, design, modeling, and analysis of nanosensors, networks, and systems: a systems engineering approach**, Seshadri Mohan, Univ. of Arkansas at Little Rock (United States) [7291-15]

Coffee Break. 10:00 to 10:30 am

Smart Structures Product Implementation
Award presentation 8:00 to 8:05 am

NIST Funding Agency Talk 8:05 to 8:20 am

Current and Future Programs and Initiatives
H. Felix Wu, National Institute of Standards and Technology
 (United States)

Plenary Presentation 8:20 to 9:05 am

Energy Harvesting: Small Scale Energy Production from Ambient Sources
Eric M. Yeatman, Imperial College London (United Kingdom)
Please see page 3 for more information.

Conference 7292

Conference 7293

Conference 7294

Conference 7295

Sessions 6 and 10 run concurrently

SESSION 4

SESSION 4

SESSION 4

SESSION 6

SESSION 10

Room: Royal Palm I
Tues. 9:10 to 10:10 am

Room: Royal Palm II
Tues. 9:10 to 10:10 am

Novel Sensors I

Damage Detection

Session Chairs: Irving J. Oppenheim, Carnegie Mellon Univ.; *Steven D. Glaser*, Univ. of California, Berkeley

Session Chairs: Jiong Tang, Univ. of Connecticut; *Kon-Well Wang*, Univ. of Michigan

9:10 am: **Crack detection using sonic infrared imaging in steel structures: experiments and theory of heating patterns**, Qi He, Xiaoyan Han, Wayne State Univ. (United States) [7292-26]

9:10 am: **Enhanced damage detection of bladed disk structures with piezoelectric transducer circuitry networks**, Ryan C. Struzik, Kon-Well Wang, Univ. of Michigan (United States) [7292-45]

9:30 am: **Sensitivity of a MEMS acoustic emission sensor system**, Amelia P. Wright, David W. Greve, Irving J. Oppenheim, Carnegie Mellon Univ. (United States) [7292-27]

9:30 am: **Damage detection using piezoelectric impedance with circuitry elements**, Xin Wang, Jiong Tang, Univ. of Connecticut (United States) [7292-46]

9:50 am: **High-fidelity conical piezoelectric transducers and finite element models utilized to quantify seismic efficiency of elastic collisions**, Gregory C. McLaskey, Steven D. Glaser, Univ. of California, Berkeley (United States) [7292-28]

9:50 am: **Fault localization using acoustic emission signals sensed by wireless microphone arrays**, Yi Lu, Jiong Tang, Univ. of Connecticut (United States) [7292-47]

Coffee Break 10:10 to 10:40 am

Coffee Break 10:10 to 10:40 am

Room: Royal Palm III
Tues. 9:10 to 10:10 am

Sensor Networks I

Session Chair: Edgar A. Mendoza, Redondo Optics, Inc.

9:10 am: **Hierarchical structural health monitoring system combining a fiber optic spinal cord network and distributed nerve cell devices**, Shu Minakuchi, Haruka Tsukamoto, Nobuo Takeda, The Univ. of Tokyo Graduate School of Frontier Sciences (Japan) [7293-15]

9:30 am: **Simulation of self-writing sensor networks**, Alisha D. Anderson, Kara J. Peters, North Carolina State Univ. (United States) [7293-16]

9:50 am: **Demonstration of an all optical fiber sensor network for closed-loop-control monitoring of the inert atmosphere environment in aircraft fuel tanks**, Edgar A. Mendoza, Redondo Optics, Inc. (United States) [7293-17]

Coffee Break 10:10 to 10:40 am

Room: Royal Palm VI
Tues. 9:10 to 10:20 am

Civil Infrastructure Health Monitoring I

Session Chairs: A. Emin Aktan, Drexel Univ.; *Hamid Ghasemi*, Federal Highway Administration

9:10 am: **Overview of structural health monitoring technology for the protection and management of critical infrastructure systems** (*Invited Paper*), Jerome P. Lynch, Univ. of Michigan (United States) [7294-19]

9:40 am: **Characterizing highway bridges**, A. Emin Aktan, Drexel Univ. (United States) [7294-20]

10:00 am: **Detection and monitoring of FRP-concrete debonding using distributed fiber optic strain sensor**, Maria Q. Feng, Univ. of California, Irvine (United States) [7294-21]

Coffee Break 10:20 to 10:50 am

Room: Royal Palm V
Tues. 9:10 to 10:10 am

Novel Instrumentation and Sensing for SHM I

Session Chairs: George Zentai, Varian Medical Systems, Inc.; *Sauvik Banerjee*, St. Louis Univ.

9:10 am: **A fiber Bragg grating based tunable laser source for quasi-static and dynamic strain monitoring**, Oluwaseyi Balogun, Sridhar Krishnaswamy, Northwestern Univ. (United States) [7295-32]

9:30 am: **Structural damage detection using ultrasonic wave modulation with low-profile piezoceramic transducers**, Wieslaw J. Staszewski, The Univ. of Sheffield (United Kingdom) [7295-33]

9:50 am: **Structural health monitoring using magnetostrictive sensors**, Alan Puchot, Charles E. Duffer, Adam Cobb, Southwest Research Institute (United States) [7295-34]

Coffee Break 10:10 to 10:40 am

Conference 7287	Conference 7288	Conference 7289	Conference 7290	Conference 7291
<p>SESSION 4 continued</p> <p>Room: Pacific Salon I-III Tues. 9:00 am to 12:10 pm</p> <p>10:30 am: Dielectric elastomer actuators with hydrostatic coupling, Federico Carpi, Gabriele Frediani, Danilo De Rossi, Univ. di Pisa (Italy) [7287-11]</p> <p>10:50 am: On designing dielectric elastomer actuators, Mickael Moscardo, French Institute of Advanced Mechanics (France); Xuanhe Zhao, Zhiqiang Suo, Harvard Univ. (United States); Yuri Lapusta, French Institute of Advanced Mechanics (France) [7287-12]</p> <p>11:10 am: Pyrrrole copolymer with improved actuation performance, Chaokun Gong, Qibing Pei, Univ. of California, Los Angeles (United States); Hongping Wang, Nikhil D. Bhat, PAVAD Medical, Inc. (United States) ... [7287 86]</p> <p>11:30 am: Closed-loop control of a core free rolled EAP actuator, Rahimullah Sarban, Jakob Oubaek, Richard W. Jones, Southern Denmark Univ. (Denmark) [7287 71]</p> <p>11:50 am: Printing 3d dielectric elastomer actuators for soft robotics, Jonathan M. Rossiter, Univ. of Bristol (United Kingdom); Peter Walters, Univ. of the West of England (United Kingdom); Boyko L. Stoimenov, The Institute of Physical and Chemical Research (RIKEN) (Japan) [7287-15]</p> <p>Lunch/Exhibition Break . 12:10 to 1:30 pm</p>	<p>Sessions 8 and 12 run concurrently</p> <div style="display: flex; justify-content: space-between;"> <div style="width: 48%;"> <p>SESSION 8</p> <p>Room: Sunrise Tues. 10:40 am to 12:00 pm</p> <p>Energy Harvesting II</p> <p><i>Session Chairs: Diann E. Brei</i>, Univ. of Michigan; Gregory S. Agnes, Jet Propulsion Lab.</p> <p>10:40 am: Results of a water based thermoelectric energy harvesting device for powering wireless sensor nodes, Christopher G. Knight, Michael Collins, Commonwealth Scientific and Industrial Research Organisation (Australia)[7288-33]</p> <p>11:00 am: Integrated event sensing and energy-harvesting power sources for gun-fired munitions, Jahangir S. Rastegar, Richard T. Murray, Omnitek Partners, LLC (United States); Carlos M. Pereira, Hai-Long Nguyen, U.S. Army Armament Research, Development and Engineering Ctr. (United States) [7288-34]</p> <p>11:20 am: Energy harvesting and wireless energy transmission for embedded sensor nodes, Kevin M. Farinholt, Stuart G. Taylor, Erik A. Moro, Gyuhae Park, Charles R. Farrar, Los Alamos National Lab. (United States); Eric B. Flynn, David L. Mascarenas, Michael D. Todd, Univ. of California, San Diego (United States) [7288-35]</p> <p>11:40 am: Power harvesting for railroad track safety enhancement using vertical track displacement, Sean E. Hansen, Carl A. Nelson, Stephen R. Platt, Univ. of Nebraska-Lincoln (United States); Mahmood A. Fateh, Federal Railroad Administration (United States) [7288-36]</p> <p>Lunch/Exhibition Break . 12:00 to 1:30 pm</p> </div> <div style="width: 48%;"> <p>SESSION 12</p> <p>Room: Sunset Tues. 10:40 am to 12:20 pm</p> <p>Piezo Systems I</p> <p><i>Session Chairs: Mehrdad N. Ghasemi-Nejhad</i>, Univ. of Hawai'i at Manoa; Jinsong Leng, Harbin Institute of Technology (China)</p> <p>10:40 am: Vibration control of piezoelectrically actuated microcantilevers, S. Nima Mahmoodi, Mehdi Ahmadian, Virginia Polytechnic Institute and State Univ. (United States) [7288-51]</p> <p>11:00 am: Implementation of a piezoelectrically actuated self-contained quadruped robot, Sangyoon Lee, Thanhtam Ho, Konkuk Univ. (Korea, Republic of) [7288-52]</p> <p>11:20 am: An approach to design a novel non-contact journal bearing using high power piezoelectric ultrasonic transducers, Su Zhao, Leibniz Univ. Hannover (Germany) [7288-53]</p> <p>11:40 am: Active and semiactive vibration damping of turbine blades with piezoceramics, Andreas Hohl, Marcus Neubauer, Lars Panning, Jörg Wallaschek, Leibniz Univ. Hannover (Germany)[7288-54]</p> <p>12:00 pm: Precise calculation of piezoelectric switching techniques for vibration damping, Marcus Neubauer, Jörg Wallaschek, Leibniz Univ. Hannover (Germany) [7288-55]</p> <p>Lunch/Exhibition Break . 12:20 to 1:30 pm</p> </div> </div>	<p>SESSION 4 continued</p> <p>Room: Pacific Salon IV-V Tues. 9:10 am to 12:00 pm</p> <p>10:40 am: Effects of severe plastic deformation and quaternary additions on the dimensional stability of NiTiPd high shape memory alloys, Kadri C. Atli, Ibrahim Karaman, Mohammed Haouaoui, Parikshith K. Kumar, Dimitris C. Lagoudas, Texas A&M Univ. (United States); Ronald D. Noebe, Glen S. Bigelow, NASA Glenn Research Ctr. (United States) [7289-17]</p> <p>11:00 am: Inelastic phenomena in TiPdNi high temperature shape memory alloys, Parikshith K. Kumar, Dimitris C. Lagoudas, Texas A&M Univ. (United States) [7289-21]</p> <p>11:20 am: Parametric study and characterization of the isobaric thermomechanical transformation fatigue of nickel-rich NiTi SMA actuators, Dimitris C. Lagoudas, Olivier W. Bertacchini, Justin R. Schick, Texas A&M Univ. (United States) [7289-22]</p> <p>11:40 am: Effects of phase inhomogeneity and boundary conditions on the dynamic response of SMA wire actuators, Debiprosad Roy Mahapatra, Kannan Dasharathi, Indian Institute of Science (India) [7289-23]</p> <p>Lunch/Exhibition Break . 12:00 to 1:30 pm</p>	<p>SESSION 5</p> <p>Room: Royal Palm IV Tues. 10:20 am to 12:00 pm</p> <p>Applications of Shape Memory Polymers (SMP) I</p> <p><i>Session Chairs: Ernie Havens</i>, Cornerstone Research Group, Inc.; Teresa E. Havens, Cornerstone Research Group, Inc.</p> <p>10:20 am: Development of a shape memory polymer fastening system, Kristin Cable, Jason M. Hermiller, Brandon Kirby, Cornerstone Research Group, Inc. (United States) [7290-24]</p> <p>10:40 am: Time dependent thermo-mechanical behavior of thermally induced shape memory polymers, H. Jerry Qi, Francisco Castro, Univ. of Colorado at Boulder (United States); Jason M. Hermiller, Ernie Havens, Cornerstone Research Group, Inc. (United States) [7290-19]</p> <p>11:00 am: Material characterization and multi-scale modeling of light activated SMP, Richard V. Beblo, Lisa M. Weiland, Univ. of Pittsburgh (United States)[7290-20]</p> <p>11:20 am: Constitutive model for photo-mechanical behaviors of photo-induced shape memory polymers, H. Jerry Qi, Kevin N. Long, Martin L. Dunn, Univ. of Colorado at Boulder (United States) [7290-22]</p> <p>Lunch/Exhibition Break . 11:40 to 1:30 pm</p>	<p>SESSION 5</p> <p>Room: Pacific Salon VI/VII Tues. 10:30 to 11:50 am</p> <p>Organic Electronics and Nanodevices</p> <p><i>Session Chair: Soyoun Jung</i>, Univ. of Arkansas</p> <p>10:30 am: Design and development of organic thin film transistors and sensors, Taeksoo Ji, Soyoun Jung, Vijay K. Varadan, Univ. of Arkansas (United States) [7291-16]</p> <p>10:50 am: Transient behavior of integrated carbon nanotube field effect transistor circuits and bio-sensing applications, Yao Xu, Ashok Srivastava, Jose M. Marulanda, Louisiana State Univ. (United States) [7291-17]</p> <p>11:10 am: Transport mechanisms in polymer and TiO2 Schottky diode, Kyungho Yoo, Yi Chen, Kwangsun Kang, Jaehwan Kim, Inha Univ. (Korea, Republic of) [7291-18]</p> <p>11:30 am: Nanodevices and electrical detection of protein, Jose K. Abraham, Vasuda Ramachandran, Univ. of Arkansas (United States); Mahendra Kavdia, ; Hargsoon Yoon, Vijay K. Varadan, Univ. of Arkansas (United States) [7291-19]</p> <p>Lunch/Exhibition Break 11:50 am to 1:30 pm</p>

Conference 7292		Conference 7293	Conference 7294	Conference 7295
Sessions 7 and 11 run concurrently				
<p>SESSION 7</p> <p>Room: Royal Palm I Tues. 10:40 am to 12:00 pm</p> <p>Wireless Sensors and Networks II</p> <p><i>Session Chairs: Jerome P. Lynch, Univ. of Michigan; Ying Lei, Xiamen Univ. (China)</i></p> <p>10:40 am: Overlapping subnet topologies to densely monitor the Yeondae Bridge using wireless sensors, Junhee Kim, Jerome P. Lynch, Univ. of Michigan (United States); Daniele Zonta, Univ. degli Studi di Trento (Italy); Chung-Bang Yun, Korea Advanced Institute of Science and Technology (Korea, Republic of) [7292-29]</p> <p>11:00 am: Design and field testing of a low-power wireless sensor network for SHM of bridges, Tyler J. Harms, Bentley Banks, Filippo Bastianini, Sahra Sedigh Sarvestani, Missouri Univ. of Science and Technology (United States) [7292-30]</p> <p>11:20 am: Monitoring forces in bridge steel cables based on EM sensor and a wireless monitoring system, Ying Lei, Xiamen Univ. (China) [7292-31]</p> <p>11:40 am: Decentralized modal analysis using smart sensors, Sung-Han Sim, Univ. of Illinois at Urbana-Champaign (United States); Min Zhang, Shantou Univ. (China); Billie F. Spencer, Jr., Univ. of Illinois at Urbana-Champaign (United States)[7292-32]</p> <p>Lunch/Exhibition Break . 12:00 to 1:30 pm</p>	<p>SESSION 11</p> <p>Room: Royal Palm II Tues. 10:40 am to 12:00 pm</p> <p>Modeling and Design of Smart Systems</p> <p><i>Session Chairs: Bogdan I. Epureanu, Univ. of Michigan; Venu Gopal Madhav Annamdas, Univ. of Pittsburgh</i></p> <p>10:40 am: Numerical simulation and experimental verification of semi-active cable vibration control system using MR damper, Pei-Yang lin, National Ctr. for Research on Earthquake Engineering (Taiwan); Kwei-Shi Cheng, National Taiwan Univ. (Taiwan); Chin-Hsiung Loh, National Taiwan Univ. (United States) . . . [7292-48]</p> <p>11:00 am: Parametric reduced order models for predicting the vibration response of complex structures with component damage and uncertainties, Sung Kwon Hong, Matthew P. Castanier, Bogdan I. Epureanu, Univ. of Michigan (United States) [7292-49]</p> <p>11:20 am: Investigating energy loss mechanisms in an SOI-based tuning-fork gyroscope, Yang Xu, Shiva K. Durgam, Zhili Hao, Old Dominion Univ. (United States); Frances R. Williams, Norfolk State Univ. (United States); Linda L. Vahala, Old Dominion Univ. (United States) . [7292-50]</p> <p>11:40 am: Active and passive interaction mechanism of smart materials for health monitoring of engineering structures, Kiran K. K. Annamdas, Univ. of Miami (United States); Venu G. M. Annamdas, Univ. of Pittsburgh (United States) . . . [7292-51]</p> <p>Lunch/Exhibition Break . 12:00 to 1:30 pm</p>	<p>SESSION 5</p> <p>Room: Royal Palm III Tues. 10:40 am to 12:00 pm</p> <p>Sensor Networks II</p> <p><i>Session Chair: Kerop D. Janoyan, Clarkson Univ.</i></p> <p>10:40 am: Sensor networks for structure monitoring, Christian Richter, Jörn Augustin, Bernd Frankenstein, Norbert Meyendorf, Fraunhofer-Institut für Zerstörungsfreie Prüfverfahren (Germany) [7293-18]</p> <p>11:00 am: Artificial immune pattern recognition for damage detection in structural health monitoring sensor networks, Bo Chen, Michigan Technological Univ. (United States); Chuanzhi Zang, Michigan Technological Univ. (United States) and Shenyang Institute of Automation (China) [7293-19]</p> <p>11:20 am: A multiagent data-fusion system for structural health monitoring, Albert C. Esterline, Jr., Mannur J. Sundaresan, North Carolina A&T State Univ. (United States) [7293-20]</p> <p>11:40 am: Wireless sensing system for bridge condition assessment and health monitoring, Michael V. Gangone, Matthew J. Whelan, Kerop D. Janoyan, Clarkson Univ. (United States) [7293-21]</p> <p>Lunch/Exhibition Break . 12:00 to 1:30 pm</p>	<p>SESSION 5</p> <p>Room: Royal Palm VI Tues. 10:50 am to 12:10 pm</p> <p>Civil Infrastructure Health Monitoring II</p> <p><i>Session Chairs: A. Emin Aktan, Drexel Univ.; Hamid Ghasemi, Federal Highway Administration</i></p> <p>10:50 am: Field experiment on monitoring of cracks in highway asphalt overlay, Fei Lu, Southeast Univ. (China); Maria Q. Feng, Univ. of California, Irvine (United States); Xinyu Gu, Shunxin Yang, Southeast Univ. (China) [7294-22]</p> <p>11:10 am: Monitoring a post-tensioned concrete box girder bridge with cracks, Jinsuk Yim, Yinghong Cao, Ming L. Wang, Univ. of Illinois at Chicago (United States) [7294-23]</p> <p>11:30 am: A new battery-powered portable structural health monitoring system, David C. Zhang, Christopher P. Aquino, Howard Chung, Acellent Technologies, Inc. (United States) [7294-24]</p> <p>11:50 am: Technologies for preventive maintenance of civil infrastructure, Masoud Ghandehari, Alexey Sidelev, New York Univ. Polytechnic Institute (United States) [7294-25]</p> <p>Lunch/Exhibition Break . 12:10 to 1:40 pm</p>	<p>SESSION 5</p> <p>Room: Royal Palm V Tues. 10:40 am to 12:00 pm</p> <p>Guided Waves for SHM I: Metal Waveguides and Temperature Effect</p> <p><i>Session Chairs: Francesco Lanza di Scalea, Univ. of California, San Diego; Hoon Sohn, Korea Advanced Institute of Science and Technology (Korea, Republic of)</i></p> <p>10:40 am: On quantifying detectable crack size in metallic structures using vibration and lamb waves, Daniel J. Inman, Virginia Polytechnic Institute and State Univ. (United States); Robert B. Owen, Extreme Diagnostics, Inc. (United States); Brad A. Butrym, Mana Afshari, Virginia Polytechnic Institute and State Univ. (United States) [7295-37]</p> <p>11:00 am: Nondestructive inspection of corrosion and delamination at the concrete-steel reinforcement interface using guided waves, Tri H. Miller, Samik Das, Tribikram Kundu, The Univ. of Arizona (United States); Wolfgang Grill, Univ. Leipzig (Germany) [7295-38]</p> <p>11:20 am: Influence of temperature on guided waves in a rectangular bar specimen, Manton J. Guers, Bernhard R. Tittmann, The Pennsylvania State Univ. (United States) [7295-39]</p> <p>11:40 am: Temperature effects in Lamb-wave structural health monitoring systems, Francesco Lanza di Scalea, Salvatore Salamone, Univ. of California, San Diego (United States) [7295-40]</p> <p>Lunch/Exhibition Break . 12:00 to 1:30 pm</p>

Conference 7287	Conference 7288	Conference 7289	Conference 7290	Conference 7291
<p style="text-align: center;">SESSION 5</p> <p style="text-align: center;">Room: Pacific Salon I-III Tues. 1:30 to 3:10 pm</p> <p style="text-align: center;">Dielectric EAP Actuators</p> <p><i>Session Chairs: Federico Carpi, Univ. di Pisa (Italy); John David W. Madden, The Univ. of British Columbia (Canada)</i></p> <p>1:30 pm: Magnetic field assisted electrospun highly aligned fibers of electrostrictive graft elastomers and electromechanical characterization, Ji Su, NASA Langley Research Ctr. (United States); Stephen Menke, Univ. of Illinois at Urbana-Champaign (United States); Tian-Bing Xu, Sang-Hyon Chu, National Institute of Aerospace (United States); Ruth H. Pater, NASA Langley Research Ctr. (United States); Vivek Rao, Youqi Wang, Kansas State Univ. (United States) [7287-16]</p> <p>1:50 pm: Toward the implementation of an elastomeric spherical pump: preliminary test results, Maryam Soleimani, Carlo Menon, Simon Fraser Univ. (Canada) [7287-17]</p> <p>2:10 pm: Self-assembling functionalized single-walled carbon nanotubes, Yan Gao, Sia Nemat-Nasser, Yitzhak Tor, Univ. of California, San Diego (United States) [7287 90]</p> <p>2:30 pm: Pulsatile dielectric elastomer membrane sensors, Seyul Son, Virginia Polytechnic Institute and State Univ. (United States); Nakhiah C. S. Goulbourne, Virginia Polytechnic Institute and State Univ. (United States) [7287-19]</p> <p>2:50 pm: Phthalocyanine and encapsulated polyaniline nanoparticles as fillers for dielectric elastomers, Dorina M. Opris, Christiane I. Löwe, Martin Molberg, Daniel Crespy, Frank A. Nüesch, EMPA (Switzerland) [7287-20]</p> <p>Coffee Break. 3:10 to 3:40 pm</p>	<p style="text-align: center;">Sessions 9 and 13 run concurrently</p> <div style="display: flex; justify-content: space-between;"> <div style="width: 48%;"> <p style="text-align: center;">SESSION 9</p> <p style="text-align: center;">Room: Sunrise Tues. 1:30 to 3:10 pm</p> <p style="text-align: center;">Energy Harvesting III</p> <p><i>Session Chair: Kon-Well Wang, The Pennsylvania State Univ.</i></p> <p>1:30 pm: Development of an aeroelastic vibration power harvester, Matthew J. Bryant, Ephraim Garcia, Cornell Univ. (United States) [7288-37]</p> <p>1:50 pm: Optimization of power generation from energy harvesters in broadband stochastic response, Jeffrey T. Scroggs, Duke Univ. (United States) [7288-38]</p> <p>2:10 pm: Thermal energy harvesting between the air/water interface for wireless sensor nodes, Josh P. Davidson, James Cook Univ. (Australia); Sam Behrens, Commonwealth Scientific and Industrial Research Organisation (Australia) [7288-39]</p> <p>2:30 pm: Thermoelectric energy harvesting by thermal-magnetic switching of ferromagnetic materials, Chia-Ming Chang, Samuel M. Sandoval, Gregory P. Carman, Univ. of California, Los Angeles (United States) [7288-40]</p> <p>2:50 pm: Combined power harvesting from AC and DC sources, Adam M. Wickenheiser, Ephraim Garcia, Cornell Univ. (United States) [7288-41]</p> <p>Coffee Break. 3:10 to 3:40 pm</p> </div> <div style="width: 48%;"> <p style="text-align: center;">SESSION 13</p> <p style="text-align: center;">Room: Sunset Tues. 1:30 to 3:10 pm</p> <p style="text-align: center;">Piezo Systems II</p> <p><i>Session Chair: Ephraim Garcia, Cornell Univ.</i></p> <p>1:30 pm: Vibration control of plates featuring periodic arrays of hybrid shunted piezoelectric patches, Massimo Ruzzene, Kenneth A. Cunefare, Benjamin S. Beck, Filippo Casadei, Georgia Institute of Technology (United States) [7288-56]</p> <p>1:50 pm: Parameter identification of piezoelectric bimorphs for dynamic applications considering strain and velocity dependent effects, Jens Twiefel, Leibniz Univ. Hannover (Germany); Björn Richter, Univ. Paderborn (Germany) [7288-57]</p> <p>2:10 pm: Averaging models for linear piezostructural systems, Woon K. Kim, Andrew J. Kurdila, Vaharam Stepanyan, Daniel J. Inman, Virginia Polytechnic Institute and State Univ. (United States); Joseph F. Vignola, The Catholic Univ. of America (United States) [7288-58]</p> <p>2:30 pm: Dynamic behavior of periodic structure integrated with piezoelectric circuitry, Ji Zhao, Jiong Tang, Univ. of Connecticut (United States) [7288-59]</p> <p>2:50 pm: A high performance piezoelectric ceramic multilayer-stacked hybrid actuation/transduction system (Stacked-HYBATS), Tian-Bing Xu, National Institute of Aerospace (United States); Xiaoning Jiang, TRS Technologies, Inc. (United States); Ji Su, NASA Langley Research Ctr. (United States) [7288-60]</p> <p>Coffee Break. 3:10 to 3:40 pm</p> </div> </div>	<p style="text-align: center;">SESSION 5</p> <p style="text-align: center;">Room: Pacific Salon IV-V Tues. 1:30 to 3:10 pm</p> <p style="text-align: center;">Shape Memory Materials II: Shape Memory Alloys</p> <p><i>Session Chair: Dimitris C. Lagoudas, Texas A&M Univ.</i></p> <p>1:30 pm: Finite element analysis of typical nitinol stent geometries, Wesley Ballew, Stefan S. Seelecke, North Carolina State Univ. (United States) [7289-24]</p> <p>1:50 pm: FE analysis of a 3D bone-joint system based on shape memory alloys, Shibin Yang, North Carolina State Univ. (United States) and Northwestern Polytechnical Univ. (China); Stefan S. Seelecke, North Carolina State Univ. (United States) [7289-25]</p> <p>2:10 pm: Assessment of various modeling approaches for SMA actuators, Matthew E. Pausley, Stefan S. Seelecke, North Carolina State Univ. (United States); Travis L. Turner, NASA Langley Research Ctr. (United States) [7289-26]</p> <p>2:30 pm: A constitutive model for high temperature SMA's exhibiting viscoplastic behavior, George Chatzigeorgiou, Dimitris C. Lagoudas, Texas A&M Univ. (United States) [7289-27]</p> <p>2:50 pm: Compressive and tensile deformation behaviors of a Ti-Mo based shape memory alloy, Chao-Ying Xie, Jie Song, Xiaoning Zhang, Shanghai Jiao Tong Univ. (China); Ming H. Wu, Edwards Lifesciences LLC (United States) [7289-28]</p> <p>Coffee Break. 3:10 to 3:40 pm</p>	<p style="text-align: center;">SESSION 6</p> <p style="text-align: center;">Room: Royal Palm IV Tues. 1:30 to 2:50 pm</p> <p style="text-align: center;">Applications of Shape Memory Polymers (SMP) II</p> <p><i>Session Chairs: Ernie Havens, Cornerstone Research Group, Inc.; Kristin Cable, Cornerstone Research Group, Inc.</i></p> <p>1:30 pm: Design methodology for attaching morphing components, Jason M. Hermiller, Matthew B. Sunday, Cornerstone Research Group, Inc. (United States); H. Jerry Qi, Francisco Castro, Univ. of Colorado at Boulder (United States) [7290-23]</p> <p>1:50 pm: Environmental exposure tracking sensor, Teresa E. Havens, Joel Everhart, Cornerstone Research Group, Inc. (United States) [7290-25]</p> <p>2:10 pm: Reflexive structures in a marine environment, Elizabeth P. Meents, Thomas J. Barnell, Kristin M. Cable, Thomas W. Margraf, Jr., Ernie Havens, Cornerstone Research Group, Inc. (United States) [7290-26]</p> <p>2:30 pm: Quality control measures for SMP production, Michael D. Rauscher, Thomas H. Tebalt, Andy K. Klein, Teresa E. Havens, Cornerstone Research Group, Inc. (United States) [7290-27]</p> <p>• Conference 7290 End.</p>	<p style="text-align: center;">Room: Pacific Salon VI/VII Tues. 1:30 to 2:00 pm</p> <p style="text-align: center;">Keynote Presentation</p> <p><i>Session Chair: Vijay K. Varadan, Univ. of Arkansas</i></p> <p>1:30 pm: Bio-nanotechnology-based devices and power technology, Sang H. Choi, NASA Langley Research Ctr. (United States) [7291-20]</p> <p style="text-align: center;">SESSION 6</p> <p style="text-align: center;">Room: Pacific Salon VI/VII Tues. 2:00 to 3:00 pm</p> <p style="text-align: center;">Sensors</p> <p>2:00 pm: Transport powder and liquid samples by SAW (Invited Paper), Xiaoyi Bao, Yoseph Bar-Cohen, Stewart Sherrit, Mircea Badescu, Jet Propulsion Lab. (United States); Sahar Louyeh, The Pennsylvania State Univ. (United States) [7291-21]</p> <p>2:20 pm: Bio/chemical sensors heterogeneously integrated with Si-CMOS circuitry (Invited Paper), Frances Williams, Moriba George, Ozgul Yasar, Demetris L. Geddis, Norfolk State Univ. (United States); Zhili Hao, Old Dominion Univ. (United States) [7291-23]</p> <p>2:40 pm: Electrical and magneto-resistance of Co/CNT/Epoxy thin film for strain and magnetic field sensing, Debiprosad Roy Mahapatra, Sandeep Anand, Rejin Isaac, Indian Institute of Science (India) [7291-24]</p> <p>Coffee Break. 3:00 to 3:30 pm</p>

Conference 7292	Conference 7293	Conference 7294	Conference 7295	
Sessions 8 and 12 run concurrently				
<p style="text-align: center;">SESSION 8</p> <p style="text-align: center;">Room: Royal Palm I Tues. 1:30 to 3:10 pm</p> <p style="text-align: center;">SHM and Damage Detection I</p> <p style="text-align: center;"><i>Session Chairs: Jeong-Tae Kim, Puikyong National Univ. (Korea, Republic of); Michael D. Todd, Univ. of California, San Diego</i></p> <p>1:30 pm: Temperature effect on hybrid damage monitoring of PSC girder bridges by using acceleration and impedance signatures, Dong-Soo Hong, Jeong-Tae Kim, Won-Bae Na, So-Young Lee, Puikyong National Univ. (Korea, Republic of) [7292-33]</p> <p>1:50 pm: Wood decay detection and assessment in glulam beams using a modified impulse-echo approach, Henrique L. Reis, Adam Senalik, Univ. of Illinois at Urbana-Champaign (United States); Frank C. Beall, Univ. of California, Berkeley (United States) [7292-34]</p> <p>2:10 pm: Estimation of low-temperature cracking threshold for asphalt binders using an acoustic emission approach, Henrique L. Reis, Alex K. Apeageyi, William G. Buttler, Univ. of Illinois at Urbana-Champaign (United States) [7292-35]</p> <p>2:30 pm: Feature-specific optimal sensor placement for active sensing, Eric B. Flynn, Michael Todd, Univ. of California, San Diego (United States) [7292-36]</p> <p>2:50 pm: Ultrasonic flaw detection in a monorail box beam, Peng Zheng, David W. Greve, Irving J. Oppenheim, Carnegie Mellon Univ. (United States). [7292-37]</p> <p>Coffee Break. 3:10 to 3:40 pm</p>	<p style="text-align: center;">SESSION 12</p> <p style="text-align: center;">Room: Royal Palm II Tues. 1:30 to 3:10 pm</p> <p style="text-align: center;">Innovative Sensing Technologies</p> <p style="text-align: center;"><i>Session Chairs: Fabrizio Barone, Istituto Nazionale Di Fisica Nucleare (Italy); Miao Yu, Univ. of Maryland, College Park</i></p> <p>1:30 pm: Structural shape sensing for variable camber wing using FBG sensors, Weilong Yin, Jincang Liu, Tao Fu, Jinsong Leng, Harbin Institute of Technology (China) [7292-52]</p> <p>1:50 pm: Self-contained harpoon and sample handling device for a remote platform, Mircea Badescu, Stewart Sherrit, Jack A. Jones, Jeffery L. Hall, Jet Propulsion Lab. (United States) [7292-53]</p> <p>2:10 pm: Improved signal conditioning circuit design for ionic polymer transducers as sensors, Barbar J. Akle, Zahi Nakad, Naim Solta, Lebanese American Univ. (Lebanon) [7292-54]</p> <p>2:30 pm: A structural health monitoring fastener for tracking fatigue crack growth in bolted metallic joints, Alexi S. Rakow, Exponent, Inc. (United States); Fu-Kuo Chang, Stanford Univ. (United States) [7292-55]</p> <p>2:50 pm: A practical system approach for fully autonomous multi-dimensional structural health monitoring, Jeong-Ki kim, Dao Zhou, Dong Sam Ha, Daniel J. Inman, Virginia Polytechnic Institute and State Univ. (United States) [7292-56]</p> <p>Coffee Break. 3:10 to 3:40 pm</p>	<p style="text-align: center;">SESSION 6</p> <p style="text-align: center;">Room: Royal Palm III Tues. 1:30 to 3:20 pm</p> <p style="text-align: center;">Smart Sensors I</p> <p style="text-align: center;"><i>Session Chair: Kara J. Peters, North Carolina State Univ.</i></p> <p>1:30 pm: Health monitoring network using smart sensor of elasticoluminescence (Invited Paper), Chaonan Xu, National Institute of Advanced Industrial Science and Technology (Japan) [7293-22]</p> <p>2:00 pm: Chemically activated nanodiamonds for aluminum alloy corrosion protection and monitoring, Jörg Opitz, Inga K. Hannstein, Norbert Meyendorf, Jürgen Schreiber, Fraunhofer-Institut für Zerstörungsfreie Prüfverfahren (Germany) [7293-23]</p> <p>2:20 pm: Self-sensing and self-healing composites, Ramani S. Mahendran, Liwei Wang, Venkata R. Machavaram, Shoab A. Malik, Gerard F. Fernando, The Univ. of Birmingham (United Kingdom) [7293-24]</p> <p>2:40 pm: Verification of the impact damage detection system for airframe structures using optical fiber sensors, Noriyoshi Hirano, Hiroaki Tsutsui, Junichi Kimoto, Takahiko Akatsuka, Hirofumi Sashikuma, Kawasaki Heavy Industries, Ltd. (Japan); Nobuo Takeda, The Univ. of Tokyo Graduate School of Frontier Sciences (Japan); Yasuhiro Koshioka, RIMCOF (Japan) [7293-25]</p> <p>3:00 pm: Spatially distributed damage detection on CMC thermal protection using thin-film piezoelectric sensors, Samuel J. M. Kuhr, Univ. of Dayton Research Institute (United States); James L. Blackshire, Air Force Research Lab. (United States); Jeong K. Na, Univ. of Dayton Research Institute (United States) [7293-26]</p> <p>Coffee Break. 3:20 to 3:50 pm</p>	<p style="text-align: center;">SESSION 6</p> <p style="text-align: center;">Room: Royal Palm VI Tues. 1:40 to 3:20 pm</p> <p style="text-align: center;">Radar NDE Technologies</p> <p style="text-align: center;"><i>Session Chairs: Maria Q. Feng, Univ. of California, Irvine; Tzu-Yang Yu, Univ. of Massachusetts, Lowell</i></p> <p>1:40 pm: Determining the optimal parameters in a distant radar NDE technique for debonding detection of GFRP-concrete systems, Tzu-Yang Yu, Univ. of Massachusetts Lowell (United States) [7294-26]</p> <p>2:00 pm: Electromagnetic acoustic transduction using a pulsed electromagnet, Stuart B. Palmer, Jose-Francisco Hernández-Valle, Steve M. Dixon, The Univ. of Warwick (United Kingdom) [7294-27]</p> <p>2:20 pm: Processing and probability analysis of pulsed terahertz NDE corrosion under shuttle tile data, Robert F. Anastasi, Eric I. Madaras, NASA Langley Research Ctr. (United States); Jeffrey P. Seebo, Thomas M. Ely, Lockheed Martin (United States) [7294-28]</p> <p>2:40 pm: Prediction of GPR performance in landmine detection, Mohammad Riahi, Iran Univ. of Science and Technology (Iran, Islamic Republic of) [7294-29]</p> <p>3:00 pm: Numerical modeling of electromagnetic-wave scattering of buried targets under different soil conditions to investigate landmine detection performance of GPR, Mohammad Riahi, Amirhossein Tavangar, Iran Univ. of Science and Technology (Iran, Islamic Republic of) [7294-30]</p> <p>Coffee Break. 3:20 to 3:50 pm</p>	<p style="text-align: center;">SESSION 6</p> <p style="text-align: center;">Room: Royal Palm V Tues. 1:30 to 3:10 pm</p> <p style="text-align: center;">Guided Waves for SHM II: Fatigue Damage and Crack Detection</p> <p style="text-align: center;"><i>Session Chairs: Hoon Sohn, Korea Advanced Institute of Science and Technology (Korea, Republic of); Francesco Lanza di Scalea, Univ. of California, San Diego</i></p> <p>1:30 pm: Characterization of fatigue damage in A36 steel with nonlinear Rayleigh waves, Laurence J. Jacobs, Suzanne Duncan, Georgia Institute of Technology (United States) [7295-45]</p> <p>1:50 pm: A comparative study of fatigue damage sensing in aluminum alloys using electrical impedance and laser ultrasonic methods, Lindsey Channels, The Johns Hopkins Univ. (United States); Debejyo Chakraborty, Arizona State Univ. (United States); Brad A. Butrym, Virginia Polytechnic Institute and State Univ. (United States); Narayan V. Kovvali, Arizona State Univ. (United States); James B. Spicer, The Johns Hopkins Univ. (United States); Antonia Papandreou-Suppappola, Arizona State Univ. (United States); Daniel J. Inman, Virginia Polytechnic Institute and State Univ. (United States) [7295-46]</p> <p>2:10 pm: Fatigue crack detection in a multi-riveted strap joint aluminium panel, Frank H. G. Stolze, Wieslaw J. Staszewski, Graeme Manson, Keith Worden, The Univ. of Sheffield (United Kingdom). [7295-47]</p> <p>2:30 pm: Outlier analysis and principal component analysis to detect fatigue cracks in waveguides, Piervincenzo Rizzo, Univ. of Pittsburgh (United States); Debaditya Dutta, Carnegie Mellon Univ. (United States); Hoon Sohn, Korea Advanced Institute of Science and Technology (Korea, Republic of) [7295-48]</p> <p>2:50 pm: Crack detection diagnostics using ultrasonic insonification and pattern recognition, Gregory J. Jarmer, Michael D. Todd, Univ. of California, San Diego (United States) [7295-49]</p> <p>Coffee Break. 3:10 to 3:40 pm</p>

Conference 7287	Conference 7288	Conference 7289	Conference 7291
<p style="text-align: center;">SESSION 6</p> <p style="text-align: center;">Room: Pacific Salon I-III Tues. 3:40 to 6:00 pm Fabrication and Characterization of EAP <i>Session Chairs: Minoru Taya, Univ. of Washington; Ji Su, NASA Langley Research Ctr.</i></p> <p>3:40 pm: Giant actuation stroke in highly aligned multiwalled carbon nanotubes, Ali E. Aliev, Jiyoung Oh, Mikhail E. Kozlov, Alexander A. Kuznetsov, Shaoli Fang, Alexandre F. Fonseca, Raquel O. Robles, Márcio D. Lima, Mohammad H. Haque, Yury N. Gartstein, Mei Zhang, Anvar A. Zakhidov, Ray H. Baughman, The Univ. of Texas at Dallas (United States) [7287-21]</p> <p>4:00 pm: Forced and free displacement characterization of ionic polymer transducers, Barbar J. Akle, Lebanese American Univ. (Lebanon); Andrew J. Duncan, Virginia Polytechnic Institute and State Univ. (United States); Etienne J. Akle, American Univ. of Beirut (Lebanon); Thomas Wallmersperger, Univ. Stuttgart (Germany); Donald J. Leo, Virginia Polytechnic Institute and State Univ. (United States) . . [7287-22]</p> <p>4:20 pm: Long lifetime dielectric elastomer actuators under continuous high, Wei Yuan, Paul Brochu, Antony Jan, Qibing Pei, Univ. of California, Los Angeles (United States) [7287-23]</p> <p>4:40 pm: The dielectric constant of 3M VHB: a parameter in dispute, Thomas G. McKay, The Univ. of Auckland (New Zealand); Emilio P. Calius, Industrial Research Ltd. (New Zealand); Iain A. Anderson, The Univ. of Auckland (New Zealand) [7287-24]</p> <p>5:00 pm: High k dielectric elastomeric materials for low voltage applications, Christiane I. Löwe, Martin Molberg, EMPA (Switzerland) and Ecole Polytechnique Fédérale de Lausanne (Switzerland); Dorina M. Opris, Christian Walder, Frank A. Nüesch, EMPA (Switzerland); Christopher J. G. Plummer, Yves Leterrier, Jan-Anders E. Manson, Ecole Polytechnique Fédérale de Lausanne (Switzerland) [7287-25]</p> <p>5:20 pm: Scalable industrial manufacturing of DEAP, Hans-Erik Kiil, Mohamed Benslimane, Danfoss A/S (Denmark) [7287-26]</p> <p>5:40 pm: Low voltage linear actuators based on carbide derived carbon powder, Janno Torop, Univ. of Tartu (Estonia); Mati Arulepp, Jaan Leis, Tartu Technologies, Ltd. (Estonia); Urmas Johanson, Andres Punning, Alvo Aabloo, Univ. of Tartu (Estonia)[7287-27]</p>	<p style="text-align: center;">Sessions 10 and 14 run concurrently</p> <div style="display: flex; justify-content: space-between;"> <div style="width: 48%;"> <p style="text-align: center;">SESSION 10</p> <p style="text-align: center;">Room: Sunrise Tues. 3:40 to 6:00 pm Shape Memory Alloy Systems <i>Session Chairs: Alison B. Flatau, Univ. of Maryland, College Park</i></p> <p>3:40 pm: Shape-variable sandwich structure with SMA honeycomb core and CFRP skins, Yoji Okabe, Hiroshi Sugiyama, The Univ. of Tokyo (Japan) [7288-42]</p> <p>4:00 pm: Optimal design of a shape memory alloy actuated composite structure with iterative finite element analysis, Richard D. Widdle, Jr., Moushumi Shome, Matthew T. Grimshaw, The Boeing Co. (United States) [7288-43]</p> <p>4:20 pm: Design and control a SMA walking robot, Ehsan Tarkesh Estefhani, Univ. of California, Riverside (United States); Mohammad H. Elahinia, Mike Zimcosky, The Univ. of Toledo (United States) . [7288-65]</p> <p>4:40 pm: Cyclic behavior of superelastic shape memory alloy wire for innovative smart concrete frame connections, Hui Qian, Zhengzhou Univ. (China); Hongnan Li, Dalian Univ. of Technology (China); Gangbing Song, Univ. of Houston (United States); Huai Chen, Zhengzhou Univ. (China) [7288-45]</p> <p>5:00 pm: Design and operation of a fully implantable SMA actuated implant for correcting short bowel syndrome, Brent A. Utter, Jonathan E. Luntz, Diann E. Brei, Univ. of Michigan (United States); Daniel H. Teitelbaum, Mott Children's Hospital, Univ. of Michigan (United States) [7288-46]</p> <p>5:20 pm: Design and experimental testing of an antagonistic SMA actuator for use in tremor cancellation, Anupam Pathak, Diann E. Brei, Jonathan E. Luntz, Univ. of Michigan (United States) [7288-47]</p> <p>5:40 pm: A bistable mechanism for chord extension morphing rotors, Terrence E. Johnson, Mary I. Frecker, Farhan Gandhi, The Pennsylvania State Univ. (United States) [7288-02]</p> </div> <div style="width: 48%;"> <p style="text-align: center;">SESSION 14</p> <p style="text-align: center;">Room: Sunset Tues. 3:40 to 4:40 pm Piezo Systems III <i>Session Chairs: Eric H. Anderson, CSA Engineering, Inc.; Steve C. Southward, Virginia Polytechnic Institute and State Univ.</i></p> <p>3:40 pm: New modular piezo actuator with built-in stress-strain transformation, Welf-Guntram Drossel, Hans-Juergen Roscher, Holger Kunze, Fraunhofer-Institut für Werkzeugmaschinen und Umformtechnik (Germany); Andreas J. Schoenecker, Lutz Seffner, Thomas Roedig, Fraunhofer-Institut für Keramische Technologien und Sinterwerkstoffe (Germany) [7288-61]</p> <p>4:00 pm: Smart adaptronic hydrostatic guiding system for machine tool slides, Christian Munzinger, Martin E. Weis, Stefan Herder, Univ. Karlsruhe [7288-62]</p> <p>4:20 pm: Design of the dual-output piezoelectric transformer based on load current balance, Chung-Chun Ho, National Taiwan Univ. (Taiwan) and Industrial Technology Research Institute (Taiwan); Y. P. Liu, National Taiwan Univ. (Taiwan); Chih-Kung Lee, National Taiwan Univ. (Taiwan) and Industrial Technology Research Institute (Taiwan); Wen-Jack J. Wu, National Taiwan Univ. (Taiwan) [7288-63]</p> </div> </div>	<p style="text-align: center;">SESSION 6</p> <p style="text-align: center;">Room: Pacific Salon IV-V Tues. 3:40 to 6:00 pm Shape Memory Materials III: Shape Memory Polymers <i>Session Chair: Christopher P. Henry, HRL Labs., LLC</i></p> <p>3:40 pm: Failure envelope of commercial shape memory polymer: strain rate and temperature dependence, Christopher P. Henry, Robert Doty, HRL Labs., LLC (United States) [7289-29]</p> <p>4:00 pm: Shape memory epoxy: a systematic study of their performance, Ingrid A. Rousseau, General Motors Corp. (United States) [7289-30]</p> <p>4:20 pm: Comparison of actuators and morphing wing skins fabricated from shape memory and elastomeric composites, Larry D. Peel, James Mejia, Texas A&M Univ., Kingsville (United States) [7289-31]</p> <p>4:40 pm: Investigation on mechanical behavior of epoxy shape memory polymer system, Haibao Lu, Harbin Institute of Technology (China) [7289-32]</p> <p>5:00 pm: Shape recovery performances of fiber-reinforced shape-memory polymer hinge, Xiaohua Wang, Xin Lan, Yanju Liu, Jinsong Leng, Harbin Institute of Technology (China) [7289-33]</p> <p>5:20 pm: Influence of radiation dose on shape memory effect of styrene copolymer, Dawei Zhang, Yanju Liu, Jinsong Leng, Harbin Institute of Technology (China) [7289-34]</p> <p>5:40 pm: Shape memory miscible blends for thermal mending, Patrick T. Mather, Erika Rodriguez, Xiaofan Luo, Syracuse Univ. (United States) [7289-35]</p>	<p style="text-align: center;">SESSION 7</p> <p style="text-align: center;">Room: Pacific Salon VI/VII Tues. 3:30 to 4:50 pm Systems <i>Session Chair: Shivan Haran, Arkansas State Univ.</i></p> <p>3:30 pm: Error compensation algorithm for patient positioning systems, Pilaka V. Murty, West Texas A&M Univ. (United States); Ilie Talpasanu, Wentworth Institute of Technology (United States) . . [7291-25]</p> <p>3:50 pm: Effects of annealing temperature on the performance of the Schottky diode fabricated with TiO2 sol-gel, Yi Chen, Kyungho Yoo, Kwang Sun Kang, Jaehwan Kim, Inha Univ. (Korea, Republic of)[7291-26]</p> <p>4:10 pm: Inverted rib waveguide with Bragg grating using solvent assisted microcontact molding and RIE for force measurement, Wei-Chih Wang, Cheng-Sheng Huang, Univ. of Washington (United States) [7291-27]</p> <p>4:30 pm: Gait sensing and analysis with application to monitoring spinal cord injury and design of prosthetic limbs, Shivan Haran, Arkansas State Univ. (United States) [7291-28]</p>

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Sessions 9 and 13 run concurrently				
<p style="text-align: center;">SESSION 9</p> <p style="text-align: center;">Room: Royal Palm I Tues. 3:40 to 6:20 pm</p> <p style="text-align: center;">Novel Sensors II</p> <p><i>Session Chairs: Genda Chen, Missouri Univ. of Science and Technology; Daniele Zonta, Univ. degli Studi di Trento (Italy)</i></p> <p>3:40 pm: A novel long-period fiber grating sensor for large strain measurement, Genda Chen, Hai Xiao, Ying Huang, Zhi Zhou, Yinan Zhang, Missouri Univ. of Science and Technology (United States) [7292-38]</p> <p>4:00 pm: A comparison of cure monitoring techniques, Liwei Wang, Surya D. Pandita, Venkata R. Machavaram, Ramani S. Mahendran, Dee Harris, Gerard F. Fernando, The Univ. of Birmingham (United Kingdom) [7292-39]</p> <p>4:20 pm: A novel FBG-based accelerometer with high sensitivity and temperature self-compensation, Limin Sun, Yang Shen, Tongji Univ. (China) [7292-40]</p> <p>4:40 pm: Photonic crystals for monitoring fatigue phenomena in steel structures, Daniele Zonta, Univ. of Trento (Italy); Andrea Chiappini, Alessandro Chiasera, Maurizio Ferrari, Univ. degli Studi di Trento, CNR-IFN (Italy); Matteo Pozzi, Lorenzo Battisti, Univ. of Trento (Italy) [7292-41]</p> <p>5:00 pm: Carbon nanotube based hydrogen sensors, Francisco A. Rumiche, Univ. of Illinois at Chicago (United States); Hsien-Hau Wang, Yugang Sun, Wei-Shan Hu, Argonne National Lab. (United States); J. Ernesto Indacochea III, Ming L. Wang, Univ. of Illinois at Chicago (United States) [7292-42]</p> <p>5:20 pm: Interference color of anodized aluminum oxide (AAO) films for sensor application, Yu Liu, Univ. of Illinois at Chicago (United States) and Argonne National Lab. (United States); Hsien Hau Wang, Argonne National Lab. (United States); Ming L. Wang, Univ. of Illinois at Chicago (United States) [7292-43]</p> <p>5:40 pm: Novel sensor technology for NDE of concrete, Xianlei Ni, Piervincenzo Rizzo, Univ. of Pittsburgh (United States); Chiara Daraio, Devvrath Khatri, California Institute of Technology (United States) [7292-44]</p> <p>6:00 pm: A biologically inspired sensor network framework for autonomous structural health monitoring, Bo Chen, Michigan Technological Univ. (United States) [7292-91]</p>	<p style="text-align: center;">SESSION 13</p> <p style="text-align: center;">Room: Royal Palm II Tues. 3:40 to 5:20 pm</p> <p style="text-align: center;">Nanotechnology in SHM/NDE</p> <p><i>Session Chairs: Anjana Jain, National Aerospace Labs. (India); Nakhiah C. S. Goulbourne, Virginia Polytechnic Institute and State Univ.</i></p> <p>3:40 pm: Thin-film active sensors for structural health monitoring, Bin Lin, Victor Giurgiutiu, Univ. of South Carolina (United States); Amar Bhalla, Chonglin Chen, The Univ. of Texas at San Antonio (United States); Jiechao Jiang, The Univ. of Texas at Arlington (United States); Ruyan Guo, The Univ. of Texas at San Antonio (United States) [7292-57]</p> <p>4:00 pm: Development and characterization of PVDF films and its comparison with PVDF copolymer, Anjana Jain, Kumar S. Jayant, A. Gayathri, P. Siva S. Rao, National Aerospace Labs. (India) [7292-58]</p> <p>4:20 pm: Nano-enhanced aerospace composites for increased damage tolerance and service life damage monitoring, Alkis Paipetis, Theodore E. Matikas, Univ. of Ioannina (Greece)[7292-59]</p> <p>4:40 pm: Polyamide thin film sensor: detecting concentration polarization and fouling of reverse osmosis membranes, Kahlil T. Detrich, Nakhiah C. Goulbourne, Virginia Polytechnic Institute and State Univ. (United States) [7292-60]</p> <p>5:00 pm: Study of health monitoring system based on remnant polarization of piezoelectric thin films, Hiroshi Sato, National Institute of Advanced Industrial Science and Technology (Japan); Minoru Taya, Univ. of Washington (United States) [7292-61]</p>	<p style="text-align: center;">SESSION 7</p> <p style="text-align: center;">Room: Royal Palm III Tues. 3:50 to 5:30 pm</p> <p style="text-align: center;">Smart Sensors II</p> <p><i>Session Chair: Stephen M. Schultz, Brigham Young Univ.</i></p> <p>3:50 pm: High-frequency eddy-current device for near-surface material characterizations, Susanne Hillmann, Henning Heuer, Norbert G. Meyendorf, Fraunhofer-Institut für Zerörungsfreie Prüfverfahren (Germany) [7293-27]</p> <p>4:10 pm: Carbon fiber-based piezoresistive linear sensing technique, Caiqian Yang, Southeast Univ. (China); Zhishen Wu, Ibaraki Univ. (Japan)[7293-28]</p> <p>4:30 pm: A system approach for temperature dependency of impedance-based structural health monitoring, Dao Zhou, Joshua Quesenberry, Jeong Ki Kim, Dong Sam Ha, Daniel J. Inman, Virginia Polytechnic Institute and State Univ. (United States) [7293-29]</p> <p>4:50 pm: Influence of the excitation frequency in the electromechanical impedance method for SHM applications, Venu G. M. Annamdas, Piervincenzo Rizzo, Univ. of Pittsburgh (United States)[7293-30]</p> <p>5:10 pm: SPICE modeling of a precise two-dimensional MOS magnetic sensor, Ali Abou-Elnour, Ajman Univ. of Science & Technology Network (United Arab Emirates) [7293-31]</p>	<p style="text-align: center;">SESSION 7</p> <p style="text-align: center;">Room: Royal Palm VI Tues. 3:50 to 5:30 pm</p> <p style="text-align: center;">Thermographic Imaging</p> <p><i>Session Chairs: Ming Wang, Northeastern Univ.; Ying Zhang, Georgia Institute of Technology, Savannah</i></p> <p>3:50 pm: Crack-tip stress field and fatigue crack growth monitoring using infrared lock-in thermography in SiCp/Al alloy composites, Dimitris P. Myriounis, Evangelos Z. Kordatos, Univ. of Ioannina (Greece); Syed T. Hasan, Sheffield Hallam Univ. (United Kingdom); Theodore E. Matikas, Univ. of Ioannina (Greece)[7294-32]</p> <p>4:10 pm: An in-situ excitation source for vibrothermography, Marc Genest, Farid Mabrouki, Abbas Fahr, National Research Council Canada (Canada); Nezhir Mrad, Defence Research and Development Canada (Canada) [7294-33]</p> <p>4:30 pm: Estimation of moisture and oil content of in-shell nuts with a capacitance sensor using discrete wavelet analysis, Chari V. Kandala, USDA Agricultural Research Service (United States) [7294-34]</p> <p>4:50 pm: Thermal imaging for quantitative assessment of subsurface corrosion, Masoud Ghandehari, Alexey Sidelev, New York Univ. Polytechnic Institute (United States) [7294-35]</p> <p>5:10 pm: Optimization of sonic thermographic inspection, Kelly A. Tsoi, Nik Rajic, Defence Science and Technology Organisation (Australia) [7294-48]</p>	<p style="text-align: center;">SESSION 7</p> <p style="text-align: center;">Room: Royal Palm IV Tues. 3:40 to 6:00 pm</p> <p style="text-align: center;">Guided Waves for SHM III: New Concepts and Applications</p> <p><i>Session Chairs: Francesco Lanza di Scalea, Univ. of California, San Diego; Hoon Sohn, Korea Advanced Institute of Science and Technology (Korea, Republic of)</i></p> <p>3:40 pm: Development of a piezocomposite transducer for shear-horizontal mode excitation in guided wave-based structural health monitoring systems, Ken I. Salas, Carlos E. S. Cesnik, Univ. of Michigan (United States) [7295-55]</p> <p>4:00 pm: Controlling acoustic-wave propagation through material anisotropy, Aref Tehranian, Alireza V. Amirkhizi, Jeffrey Irion, Jon B. Isaacs, Siavouche Nemat-Nasser, Univ. of California, San Diego (United States) [7295-56]</p> <p>4:20 pm: High resolution guided wave pipe inspection, Paul D. Wilcox, Alexander Velichko, Univ. of Bristol (United Kingdom) [7295-57]</p> <p>4:40 pm: Using diffuse field interferometry for structural and material characterization in complex aircraft structures, Adelaide Duroux, James Ayers III, Karim G. Sabra, Massimo Ruzzene, Georgia Institute of Technology (United States) [7295-58]</p> <p>5:00 pm: Development of an optic-based guided wave excitation technique, Hyun-Jun Park, Hoon Sohn, Korea Advanced Institute of Science and Technology (Korea, Republic of); Il-Bum Kwon, Korea Research Institute of Standards and Science (Korea, Republic of); Chung-Bang Yun, Korea Advanced Institute of Science and Technology (Korea, Republic of) [7295-59]</p> <p>5:20 pm: A new warped frequency transformation (WFT) for guided waves characterization, Luca De Marchi, Alessandro Marzani, Salvatore Caporale, Nicolò Speciale, Univ. degli Studi di Bologna (Italy) [7295-60]</p> <p>5:40 pm: Elastic wave propagation in hexagonal honeycomb sandwich composite by using piezoelectric actuators/sensors, G. L. Huang, F. Song, J. H. Kim, Univ. of Arkansas at Little Rock (United States) [7295-109]</p>

Posters - Tuesday

Room: Golden Ballroom/Exhibition Hall

Poster presenters may set up from 10:00 am to 4:00 pm on Tuesday 10 March. Poster presenters who have not set up by 4:00 pm on Tuesday will be considered a “no show” and their manuscript will not be published. Presenters must remove their posters on Wednesday by 4:00 pm. Posters not removed will be considered unwanted and will be discarded. SPIE assumes no responsibility for posters left up after 4:00 pm on Wednesday 11 March.

Conf. 7287 Electroactive Polymer Actuators and Devices (EAPAD) XI

Silicone dielectric elastomers filled with nanotubes and actuator for eyeball's movement, Zhen Zhang, Liwu Liu, Liang Shi, Jinsong Leng, Harbin Institute of Technology (China) [7287-17]

Effect of organo-clay on actuation response of silicone rubber actuators, Nafiseh Gharavi, Mehdi Razzaghi Kashani, Tarbiat Modarres Univ. (Iran, Islamic Republic of) [7287-66]

A study of the dielectrophoresis force of elastomeric materials for artificial muscle applications, Ruksapong Kunanuruksapong, Anuvat Sirivat, Chulalongkorn Univ. (Thailand) . . . [7287-67]

Modeling and experimental verification of a dielectric polymer energy scavenging cycle, Yousef H. Iskandarani, Richard Jones, Univ. of Southern Denmark (Denmark) [7287-68]

Experimental performance and feasibility of a miniature single-degree-of-freedom rotary joint with integrated IPMC actuator, Sean K. Manley, Andrew McDaid, Kean C. Aw, Shane Xie, Enrico Haemmerle, The Univ. of Auckland (New Zealand) [7287-89]

Creep effect modeling for a core free tubular actuator, Rahimullah Sarban, Jakob Oubaek, Richard W. Jones, Southern Denmark Univ. (Denmark) [7287-69]

Development of multilayer conducting polymer actuator for power application, Kimiya Ikushima, Yuji Kudoh, Maki Hiraoka, Kazuo Yokoyama, Sachio Nagamitsu, Panasonic Corp. (Japan) [7287-70]

Electroactive nanostructured thermoplastic elastomers for actuator application, Chong Min Koo, Korea Institute of Science and Technology (Korea, Republic of); Yongsok Seo, Seoul National Univ. (Korea, Republic of); Soon Man Hong, Korea Institute of Science and Technology (Korea, Republic of) [7287-72]

Postgraduate education on electro-active polymers at Southern Denmark University, Richard W. Jones, Jakob Oubaek, Rahimullah Sarban, Southern Denmark Univ. (Denmark) [7287-73]

Performance advancement of IPMC by anisotropic plasma etching process, Seok Hwan Lee, Chul-Jin Kim, Sung-Joo Kim, Hyun-Seok Yang, No-Cheol Park, Young-Pil Park, Yonsei Univ. (Korea, Republic of) [7287-74]

Linear modeling of elongated IPMC actuator at large deformations, Indrek Must, Univ. of Tartu (Estonia); Mart Anton, Michigan State Univ. (United States) and Univ. of Tartu (Estonia); Maarja Kruusmaa, Univ. of Tartu (Estonia) and Tallinn Univ. of Technology (Estonia); Alvo Aabloo, Univ. of Tartu (Estonia) [7287-75]

Optimization of electrode placement in electromyographic control of dielectric elastomers, Scott H. Walbran, Guy R. Dunlop, The Univ. of Auckland (New Zealand); Emilio P. Calius, Industrial Research Ltd. (New Zealand); Iain A. Anderson, The Univ. of Auckland (New Zealand) [7287-76]

Modeling of the IPMC actuator using finite element method, Chul-Jin Kim, Yonsei Univ. (Korea, Republic of) [7287-78]

Development of IPMC-based fish-like aquatic robot using resonant frequency, Hyun-Woo Hwang, Chul-Jin Kim, Hyun-Seok Yang, No-Cheol Park, Young-Pil Park, Yonsei Univ. (Korea, Republic of) [7287-79]

Ionic liquids adsorbed cellulose electro active paper actuator, Suresha K. Mahadeva, Jyoti Nayak, Jaehwan Kim, Inha Univ. (Korea, Republic of) [7287-80]

Coupled electro-mechanical response, large deformation and charge transport in a electroactive polymer cantilever structure, Debiprosad Roy Mahapatra, B. Ahish, Indian Institute of Science (India) [7287-81]

Material properties of SEBS 500120 for dielectric elastomer actuators, Matthias Kollosche, Michael Melzer, Guggi Kofod, Univ. Potsdam (Germany) [7287-82]

Diamond dielectric elastomer actuator and its application in hopping mechanism, Huaming Wang, Nanjing Univ. of Aeronautics and Astronautics (China) [7287-83]

Bio-inspired tactile sensor with arrayed structures based on electroactive polymers, Jin Wang, Chunye Xu, Minoru Taya, Univ. of Washington (United States) [7287-84]

Soft IPMC robot swimming in viscous fluid, Boyko L. Stojmenov, The Institute of Physical and Chemical Research (RIKEN) (Japan); Jonathan M. Rossiter, Univ. of Bristol (United Kingdom); Toshiharu Mukai, The Institute of Physical and Chemical Research (RIKEN) (Japan) [7287-85]

Integrated gas valve array using dielectric elastomer actuators, Klaus P. Flittner, Peter Lotz, Marc Matysek, Michael Schlosser, Helmut F. Schlaak, Technische Univ. Darmstadt (Germany) . . [7287-87]

Peristaltic pump made of dielectric elastomer actuators, Peter Lotz, Marc Matysek, Helmut F. Schlaak, Technische Univ. Darmstadt (Germany) [7287-88]

Performance of polymer-steel sandwich structures under blast loads, Ahsan Samiee, Jon B. Isaacs, Sia Nemat-Nasser, Univ. of California, San Diego (United States) [7287-91]

Focusing and negative refraction in anisotropic indefinite permittivity media, Sara Marshall, Alireza V. Amirkhizi, Sia Nemat-Nasser, Univ. of California, San Diego (United States) [7287-92]

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A smart compliant mechanism made of SMA actuators utilizing shape memory and superelastic effects, Muthuswamy Sreekumar, Indian Institute of Technology Madras (India) [7288-94]

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Young modulus of Zig-Zag CNT via linkage between molecular mechanics and continuum mechanics, Hossein Sadeghi, Reza Naghdabadi, Sharif Univ. of Technology (Iran, Islamic Republic of) [7289-72]

Development of proton exchange membrane from bisphenol S for using in direct methanol fuel cell, Sairung Changkhamchom, Anuvat Sirivat, Chulalongkorn Univ. (Thailand) [7289-73]

Three-dimensional elasticity solution of cross-ply shallow and non-shallow FGM panels with piezoelectric layers under dynamic load, AliReza Daneshmehr, Univ. of Tehran (Iran, Islamic Republic of); M. Javanbakht, AmirKabir Univ. of Technology; M. Shakeri, AmirKabir Univ. of Technology (Iran, Islamic Republic of) [7289-74]

Material property measurement of bio-structures using digital image correlation technique, Tailie Jin, Nam Seo Goo, Hoon Cheol Park, Konkuk Univ. (Korea, Republic of) [7289-75]

Temperature-pressure characteristics of SMH actuator system using hydrogen-absorbing alloys, Kyung Kim, Dong-Wook Kim, Tae-Kyu Kwon, Nam-Gyun Kim, Chonbuk National Univ. (Korea, Republic of) [7289-76]

Phase transformations and superelasticity of a Ni-rich Ti-Ni alloy with ultra-fine-grain structure, Chao-Ying Xie, Zhiguo Fan, Shanghai Jiao Tong Univ. (China) [7289-77]

Modeling a multifunctional composite structure in the framework of variational asymptotic method, H. Sreedhara, Dineshkumar K. Harursampath, Indian Institute of Science (India) [7289-79]

Study of temperature dependant polarization behavior of cellulose EAPap, Gyu-Young Yun, Minhee Lee, Joo-Hyung Kim, Jaehwan Kim, Inha Univ. (Korea, Republic of) [7289-80]

Conf. 7290 Industrial and Commercial Applications of Smart Structures Technologies III

Design and analysis of morphing wing based on SMP composite, kai yu, Weilong Yin, Yanju Liu, Jinsong Leng, Harbin Institute of Technology (China) [7290-28]

Development of the training system for postural control on the unstable platform using magneto-rheological dampers, Yong-Jun Piao, Tae-Kyu Kwon, Dong-Wook Kim, Nam-Gyun Kim, Chonbuk National Univ. (Korea, Republic of) [7290-29]

Design and aerodynamic characteristics of a span morphing wing, Yuemin Yu, Yanju Liu, Jinsong Leng, Harbin Institute of Technology (China) . . . [7290-30]

Reference specimen for detectability evaluation of thermographic NDT system, Kisoo Kang, Manyong Choi, Jeonghak Park, Korea Research Institute of Standards and Science (Korea, Republic of); Wontae Kim, Kongju National Univ. (Korea, Republic of) [7290-31]

Conf. 7291 Nano-, Bio-, and Info-Tech Sensors and Systems

Low temperature deposition of carbon nanotube, KyungNam Kang, Yoonyoung Jin, Pratul K. Ajmera, Louisiana State Univ. (United States) [7291-37]

Conf. 7292 Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems

Seismic waves velocity measurement with mechanical monolithic sensors, Fabrizio Barone, Istituto Nazionale di Fisica Nucleare (Italy); Fausto Acernese, Univ. degli Studi di Salerno (Italy); Gerardo Giordano, Univ. degli Studi di Napoli Federico II (Italy); Rocco Romano, Univ. degli Studi di Salerno (Italy) [7292-148]

Development of viscosity sensor with long period fiber grating technology, Jian-Neng Wang, National Yunlin Univ. of Science and Technology (Taiwan); Jyh-Dong Lin, National Central Univ. (Taiwan); Shih-Huang Chen, Feng Chia Univ. (Taiwan); Juei-Mao Wang, National Central Univ. (Taiwan) . . [7292-149]

Development of relative load carrying capacity evaluation system using analysis of bridge ambient, Woo Sang Lee, Korea Institute of Construction Technology (Korea, Republic of) [7292-150]

Detection of local damage in complex nonlinear structures based on substructural approach, Ying Lei, Xiamen Univ. (China) [7292-151]

Experimental investigation on dynamic properties of concrete columns embedded with shape memory alloy, Di Cui, Hongnan Li, Dalian Univ. of Technology (China); Gangbing Song, Univ. of Houston (United States) [7292-152]

Health monitoring system for a tall building with fiber Bragg grating sensors, Dongsheng Li, Dalian Univ. of Technology (China) [7292-153]

Test bed bridge integration for safety network management system, Ki-Tae Park, Bong-Chul Joo, Yoon-Koog Hwang, Jin-Hyung Lee, Korea Institute of Construction Technology (Korea, Republic of) [7292-154]

Adaptive conjugate smoothing of digital images using photo-elastic coatings, Arvydas Palevicius, Mirvydas Ragulskis, Algimantas Aleksa, Kaunas Univ. of Technology (Lithuania); Jurate Ragulskiene, Kaunas College (Lithuania) [7292-155]

Posters - Tuesday

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Piezoelectric sensor system for simultaneous local and global diagnosis of structural health, Yongrae Roh, Hyeoksang Kwon, Byungsoo Kim, Kyungpook National Univ. (Korea, Republic of) [7292-156]

Mechanical monolithic tiltmeter for low frequency measurements, Fabrizio Barone, Istituto Nazionale di Fisica Nucleare (Italy); Fausto Acernese, Univ. degli Studi di Salerno (Italy); Rosario De Rosa, Gerardo Giordano, Univ. degli Studi di Napoli Federico II (Italy); Rocco Romano, Univ. degli Studi di Salerno (Italy) [7292-157]

Experimental results of reduction of laser beam geometrical fluctuations using an Adaptive Optics system based on interferometric techniques, Salvatore Grasso, Univ. degli Studi di Roma Tre (Italy); Fausto Acernese, Rocco Romano, Univ. degli Studi di Salerno (Italy); Fabrizio Barone, Istituto Nazionale di Fisica Nucleare (Italy) [7292-158]

MEMS microphone array for hearing aid application, Peiyu Zhang, Univ. of Calgary (Canada) [7292-159]

The application of fiber Bragg grating sensor on the measurement of vibration, Shih-Chuan Her, Yuan-Ze Univ. (Taiwan) [7292-160]

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Vibration control of a flexible beam with shaped piezoelectric films, Tsutomu Nishigaki, Kinki Univ. (Japan) [7292-162]

Electromagnetic testing and image reconstruction with flexible scanning tablets, Yoshihiro Nishimura, National Institute of Advanced Industrial Science and Technology (Japan); Kamen Kanev, Shizuoka Univ. (Japan); Akira Sasamoto, Takayuki Suzuki, National Institute of Advanced Industrial Science and Technology (Japan); Hiroshi Inokawa, Shizuoka Univ. (Japan) [7292-166]

An image reconstruction from ECT data of complex flaws, Akira Sasamoto, Takayuki Suzuki, Yoshihiro Nishimura, National Institute of Advanced Industrial Science and Technology (Japan) [7292-167]

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A novel embedded fiber optic acoustic emission sensor and its applications for monitoring failures of composite laminates, Tao Fu, Yanju Liu, Jinsong Leng, Harbin Institute of Technology (China) [7293-43]

Application of wavelet denoising method for the measurement of cable force based on Brillouin system, Zhi Zhou, Harbin Institute of Technology (China) [7293-46]

A new kind of full-scale monitoring smart cable based on BOTDR technique, Zhi Zhou, Harbin Institute of Technology (China) [7293-47]

On the feasibility of low-power wireless sensor devices in an industrial environment, Alex A. Mason, Andrew Shaw, Ahmed I. Al-Shamma'a, Liverpool John Moores Univ. (United Kingdom) [7293-48]

Wireless LAN: security issues and best practices, Binod Bhattacharai, Sardar Vallabhbhai National Institute of Technology (India) [7293-49]

Intelligent inventory management for packaged gases, Alex A. Mason, Andrew Shaw, Ahmed I. Al-Shamma'a, Liverpool John Moores Univ. (United Kingdom) [7293-50]

Carbon monoxide detection by PEDOT-PSS/zeolite composites gas sensing materials, Pojawan Chanthanont, Anuvat Sirivat, Chulalongkorn Univ. (Thailand) [7293-51]

Conf. 7295 Health Monitoring of Structural and Biological Systems III

The study on analysis of temperature effect of FBG optical fiber sensor introduced for long-term monitoring system, Bong-Chul Joo, Ki-Tae Park, Yoon-Koog Hwang, Chin-Hyung Lee, Korea Institute of Construction Technology (Korea, Republic of) [7295-62]

SAR measurement in MRI: an improved method, Fabrizio Barone, Istituto Nazionale di Fisica Nucleare (Italy); Fausto Acernese, Rocco Romano, Univ. degli Studi di Salerno (Italy); Pietro L. Indovina, Univ. degli Studi di Napoli Federico II (Italy) [7295-98]

Fractional volume integration in two-dimensional NMR spectra: CAKE, a Monte Carlo approach, Fabrizio Barone, Istituto Nazionale di Fisica Nucleare (Italy); Rocco Romano, Fausto Acernese, Univ. degli Studi di Salerno (Italy); Debora Paris, Andrea Motta, Istituto Nazionale di Ottica Applicata (Italy) [7295-99]

A structural health monitoring system for self-repairing, Jeong-Ki kim, Dao Zhou, Dong-Sam Ha, Daniel J. Inman, Virginia Polytechnic Institute and State Univ. (United States) [7295-100]

Weekend effect of temperature variation in the Yangtze River Delta of China, Li Ma, Zhihong Jiang, Chunfeng Duan, Qilong Miao, Yong Wang, Nanjing Univ. of Information Science & Technology (China) [7295-102]

Data-based approach for identifying the hysteretic performance of a structure, Bin Xu, Ren Zhou, Jia He, Hunan Univ. (China); Sami F. Masri, Univ. of Southern California (United States) [7295-104]

Validation of a general data-based identification approach for nonlinear structure, Bin Xu, Jia He, Hunan Univ. (China); Sami F. Masri, Univ. of Southern California (United States) [7295-105]

ARMA and neural network models based structural parameter identification using vibration measurement time series, Bin Xu, Ansu Gong, Hunan Univ. (China) [7295-106]

Biomedical imaging with radio-frequency radiometry, Andrew Nguyen, Univ. of California, Irvine (United States) [7295-107]

Wireless non-contact measurement of human's heartbeat and bloodflow with microwave interferometry, Andrew Nguyen, Univ. of California, Irvine (United States) [7295-108]



Posters/Exhibition Reception

Golden Ballroom/Exhibition Hall

Tuesday 10 March 6:00 to 7:30 pm

A joint poster session and exhibition reception will be held on Tuesday evening for all attendees. Refreshments will be served.

**ASME/SPIE Best Student Paper Award and
ASME Best Paper Award presentation. 8:00 to 8:05 am**

ONR Funding Agency Talk 8:05 to 8:20 am

Current and Future Programs and Initiatives

Paul Hess/Liming Salvino, Office of Naval Research (United States)

Plenary Presentation 8:20 to 9:05 am

**NDE Simulations: Critical Tools in the Integration
of NDE and SHM**

R. Bruce Thompson, Ames Lab./NDE Ctr., Iowa State Univ.

Please see page 3 for more information.

Conference 7286	Conference 7287	Conference 7288	Conference 7289	Conference 7291
SESSION 1	SESSION 7	SESSION 15	SESSION 7	SESSION 8
Room: Sunset Wed. 9:10 to 9:50 am	Room: Pacific Salon I-III Wed. 9:10 am to 12:10 pm	Room: Sunrise Wed. 9:10 to 10:10 am	Room: Pacific Salon IV-V Wed. 9:10 to 10:10 am	Room: Pacific Salon VI/VII Wed. 9:10 to 10:10 am
Optimization	Ionic EAP Based on IPMC	Shape Memory Alloy and Polymer Systems	Active Composites	Sensors and Systems
<i>Session Chair: Paulo H. Nakasone, Escola Politécnica da Univ. de São Paulo (Brazil)</i>	<i>Session Chairs: Federico Carpi, Univ. di Pisa (Italy); Gerald U. Gerlach, Technische Univ. Dresden (Germany)</i>	<i>Session Chair: Lingyu Yu, Univ. of South Carolina</i>	<i>Session Chair: Zoubeida Ounaies, Texas A&M Univ.</i>	<i>Session Chair: Jaehwan Kim, Inha Univ. (Korea, Republic of)</i>
9:10 am: Layout optimization of a multi-zoned, multi-layered composite wing under free vibration , Tyler VanderVelde, Abbas Milani, The Univ. of British Columbia (Canada) [7286-01]	9:10 am: Performance analysis of ionomeric polymer/conductive network composite actuators (Invited Paper) , Qiming Zhang, The Pennsylvania State Univ. (United States) [7287-28]	9:10 am: Swelling effect actuation of shape-memory polymer: mechanism and demonstration , Haibao Lu, Harbin Institute of Technology (China) [7288-64]	9:10 am: Modeling the nonlinear behavior of macro fiber composite actuators , Michael Stuebner, Ralph C. Smith, North Carolina State Univ. (United States) [7289-36]	9:10 am: Chitosan blended bacterial cellulose as a smart material for biomedical application , Zhijiang Cai, Hyoung-Joon Jin, Jaehwan Kim, Inha Univ. (Korea, Republic of) [7291-29]
9:30 am: Design of piezoelectric energy harvesting devices and laminate structures by applying topology optimization , Paulo H. Nakasone, Emilio C. N. Silva, Escola Politécnica da Univ. de São Paulo (Brazil) [7286-02]	9:40 am: Modeling and experimental investigations of the sensitivity of chemical sensors based on polyelectrolytic hydrogels , Margarita Guenther, Gerald U. Gerlach, Technische Univ. Dresden (Germany); Thomas Wallmersperger, Univ. Stuttgart (Germany); Volker Schulz, Technische Univ. Dresden (Germany) [7287-29]	9:30 pm: Design of a bat-wing morphing aircraft with embedded SMA/SMP 'smart joint' actuators , Justin E. Manzo, Ephraim Garcia, Cornell Univ. (United States) [7288-44]	9:30 am: Self-sensing and actuation via stress and strain dielectric response , Yuri M. Shkel, Univ. of Wisconsin, Madison (United States) [7289-37]	9:30 am: Piezoelectric sensor characteristics of electro-active paper , Ho Cheol Lee, Heung Soo Kim, Catholic Univ. of Daegu (Korea, Republic of); Gyu Young Yun, Jaehwan Kim, Inha Univ. (Korea, Republic of) [7291-30]
Coffee Break. 9:50 to 10:20 am	Coffee Break. 10:00 to 10:30 am	9:50 am: Shape memory composite deformable mirrors , Marco Riva, Politecnico di Milano (Italy) and Istituto Nazionale di Astrofisica (Italy); Paolo Bettini, Giuseppe Sala, Politecnico di Milano (Italy) [7288-66]	9:50 am: Electromechanical characterization of a single fiber lamina for multifunctional composites , Yirong Lin, Henry A. Sodano, Arizona State Univ. (United States) [7289-38]	9:50 am: Surface Acoustic Wave (SAW) device using piezoelectric cellulose EAPap: fabrication and characterization , Joo-Hyung Kim, Gyu-Young Yun, Sangdong Jang, Min-Hee Lee, Jaehwan Kim, Inha Univ. (Korea, Republic of) [7291-31]
		Coffee Break. 10:10 to 10:40 am	Coffee Break. 10:10 to 10:40 am	Coffee Break. 10:10 to 10:40 am

**ASME/SPIE Best Student Paper Award and
ASME Best Paper Award presentation. 8:00 to 8:05 am**

ONR Funding Agency Talk 8:05 to 8:20 am

Current and Future Programs and Initiatives

Paul Hess/Liming Salvino, Office of Naval Research (United States)

Plenary Presentation 8:20 to 9:05 am

**NDE Simulations: Critical Tools in the Integration
of NDE and SHM**

R. Bruce Thompson, Ames Lab./NDE Ctr., Iowa State Univ.

Please see page 3 for more information.

Conference 7292

Conference 7293

Conference 7294

Conference 7295

Sessions 14 and 18 run concurrently

SESSION 8

SESSION 8

Sessions 8 and 12 run concurrently

SESSION 14

SESSION 18

**Room: Royal Palm III
Wed. 9:10 to 11:20 am**

**Room: Royal Palm VI
Wed. 9:10 to 10:10 am**

SESSION 8

SESSION 12

**Room: Royal Palm V
Wed. 9:10 to 10:10 am**

**Room: Royal Palm IV
Wed. 9:10 to 10:10 am**

**Room: Royal Palm I
Wed. 9:10 to 10:10 am**

**Monitoring Approach and
Systems**

Ultrasound

**Fiber Optic Sensing
Technologies I**

**Guided Waves for SHM IV:
Aerospace Applications**

**Bio-Inspired Flapping
System for SHM**

Modeling and Mechanics I
Session Chairs: Chin-Hsiung Loh, National Taiwan Univ. (Taiwan); Kamal Bajoria, Indian Institute of Technology, Bombay (India)

Session Chairs: Amr M. Baz, Univ. of Maryland, College Park; Paul Fromme, Univ. College London (United Kingdom)

Session Chair: Kara J. Peters, North Carolina State Univ.

Session Chairs: Farhad Ansari, Univ. of Illinois, Chicago; Yang Wang, Georgia Institute of Technology

Session Chairs: Sourav Banerjee, Acellent Technologies, Inc.; Guoliang Huang, Univ. of Arkansas at Little Rock

Session Chairs: Olivier Giraud, ONERA (France); Sauvik Banerjee, IIT (India)

9:10 am: **Finite element-based damage identification of RC frames**, Jian-Huang Weng, Chin-Hsiung Loh, National Taiwan Univ. (Taiwan); Wen-I Liao, National Taipei Univ. of Technology (Taiwan) . . . [7292-62]

9:10 am: **Wireless impedance device for electromechanical impedance sensing and low-frequency vibration data acquisition**, Stuart G. Taylor, Kevin M. Farinholt, Gyuhae Park, Charles R. Farrar, Los Alamos National Lab. (United States); Eric B. Flynn, David L. Mascarenas, Michael D. Todd, Univ. of California, San Diego (United States) [7292-79]

9:10 am: **Monitoring system of wind turbine rotor blades**, Bernd Frankenstein, Lars Schubert, Norbert G. Meyendorf, Fraunhofer-Institut für Zerstörungsfreie Prüfverfahren (Germany); Herbert Friedmann, Carsten Ebert, Wölfel Beratende Ingenieure GmbH & Co KG (Germany) [7293-32]

9:10 am: **Low frequency fiber Bragg grating based serially multiplexed accelerometer for SHM of bridges**, Iman Talebinejad, Chad Fischer, Farhad Ansari, Univ. of Illinois at Chicago (United States) [7294-41]

9:10 am: **Damage state evaluation of adhesive composite joints using chaotic ultrasonic waves**, Timothy R. Fasel, Matthew B. Kennel, Michael D. Todd, Univ. of California, San Diego (United States); Gyuhae Park, Los Alamos National Lab. (United States) [7295-69]

9:10 am: **Bio-inspired flapping UAV design: a university perspective** (*Keynote Presentation*), Jae-Hung Han, Jun-Seong Lee, Korea Advanced Institute of Science and Technology (Korea, Republic of); Dae-Kwan Kim, Korea Aerospace Research Institute (Korea, Republic of) . . . [7295-35]

9:30 am: **Nonlinear finite element analysis of a shape memory alloy truss**, Kamal Bajoria, Surajit Das, Indian Institute of Technology, Bombay (India) . . . [7292-63]

9:30 am: **Structural health monitoring for frame structure with semi-rigid joints**, Chun-Hung Lin, Henry T. Y. Yang, Univ. of California, Santa Barbara (United States) [7292-80]

9:30 am: **CW laser-generated ultrasound techniques for microstructure material properties evaluation**, Graham J. Thursby, Brian Culshaw, S. Gareth Pierce, Alison Cleary, Campbell McKee, Univ. of Strathclyde (United Kingdom) . . [7293-33]

9:30 am: **Fiber optic thermal health monitoring of aerospace structures and materials**, Meng-Chou Wu, William P. Winfree, Sidney G. Allison, NASA Langley Research Ctr. (United States) . . [7294-42]

9:30 am: **Theoretical modeling of guided wave propagation in honeycomb composites**, Sauvik Banerjee, Indian Institute of Technology, Bombay (India); Harsh K. Baid, Ajit K. Mal, Univ. of California, Los Angeles (United States) . . . [7295-70]

9:50 am: **Evaluation of flexible flapping wing concept**, Brieuc Danet, Thomas Rakotomamonjy, Xavier Gadoulet, Thierry Le Moing, Daniel R. Osmont, ONERA (France) [7295-36]

9:50 am: **Data models and diagnosis algorithms to support structural health monitoring system for buildings**, Akira Mita, Shuichi Ogawa, Keio Univ. (Japan) [7292-64]

9:50 am: **Structural health monitoring using power flow metric**, Amr M. Baz, Univ. of Maryland, College Park (United States) [7292-81]

9:50 am: **Gas-leak localization using distributed ultrasonic sensors**, Javid J. Huseynov, Univ. of California, Irvine (United States) and General Monitors, Inc. (United States); Shankar B. Baliga, General Monitors, Inc. (United States); Nader Bagherzadeh, Lubomir F. Bic, Michael B. Dillencourt, Univ. of California, Irvine (United States)[7293-34]

9:50 am: **Optical fiber temperature probes based on luminescent functional polymers**, Masoud Ghandehari, New York Univ. Polytechnic Institute (United States); Gamal Khalil, New York Univ. Polytechnic Univ (United States); Alexey Sidelev, New York Univ. Polytechnic Institute (United States) [7294-43]

9:50 am: **Frequency-wavenumber domain methods for analysis of incident and scattered guided wave fields**, Thomas E. Michaels, Massimo Ruzzene, Jennifer E. Michaels, Georgia Institute of Technology (United States) [7295-71]

Coffee Break. 10:10 to 10:40 am

Coffee Break. 10:10 to 10:40 am

Coffee Break. 10:10 to 10:40 am

Coffee Break. 10:10 to 10:40 am

Coffee Break. 10:10 to 10:40 am

Conference 7286	Conference 7287	Conference 7288	Conference 7289	Conference 7291
<p style="text-align: center;">SESSION 2</p> <p style="text-align: center;">Room: Sunset Wed. 10:20 to 11:20 am</p> <p style="text-align: center;">Smart Robotic Actuators <i>Session Chair: Seetharaman Natarajan, CVRDE, DRDO (India)</i></p> <p>10:20 am: Electro-mechanical actuator-based locomotion of mobile robot, Seetharaman Natarajan, Combat Vehicles Research & Development Establishment (India) [7286-03]</p> <p>10:40 am: Design and control of a new robotic module actuated by shape memory alloy springs, Alireza Hadi, Univ. of Tehran (Iran, Islamic Republic of) [7286-04]</p> <p>11:00 am: Workspace modeling using real planes in network-based mobile robot, Jae-kyu Lee, Seongjin Ahn, Jin-Wook Chung, Sungkyunkwan Univ. (Korea, Republic of) [7286-05]</p> <p style="text-align: center;">SESSION 3</p> <p style="text-align: center;">Room: Sunset Wed. 11:20 am to 12:00 pm</p> <p style="text-align: center;">Estimation</p> <p>11:20 am: Study on dynamic frequencies identification of cables, Yu Song, Jianxin Wang, Xiamen Univ. (China) [7286-07]</p> <p>11:40 am: Thermo photo elasticity: hybrid numerical experimental approach for investigation of smart structures, Arvydas Palevicius, Minvydas Ragulskis, Edita Sakyte, Regita Bendikiene, Kauno Technologijos Univ. (Lithuania) [7286-08]</p> <p>Lunch/Exhibition Break 12:00 to 1:30 pm</p>	<p style="text-align: center;">SESSION 7 continued</p> <p style="text-align: center;">Room: Pacific Salon I-III Wed. 9:10 am to 12:10 pm</p> <p>10:30 am: Dynamical variation of the impedances of IPM C, Karl Kruusamäe, Andres Punning, Maarja Kruusmaa, Alvo Aabloo, Univ. of Tartu (Estonia) [7287-30]</p> <p>10:50 am: A novel ionic polymer-metal composites (IPMCs) incorporating ZnO thin film, Sang-Mun Kim, Rashi Tiwari, Kwang J. Kim, Univ. of Nevada, Reno (United States) [7287-31]</p> <p>11:10 am: Newly developed PFSA or TRIPA based IPMCs for microwave-driven systems, Kwang J. Kim, Univ. of Nevada, Reno (United States); Chulsung Bae, Univ. of Nevada, Las Vegas (United States); Il-Seok Park, Univ. of Nevada, Reno (United States); Tae Soo Jo, Woosoon Yim, Joon-Soo Lee, Univ. of Nevada, Las Vegas (United States) [7287-32]</p> <p>11:30 am: Improving speed and efficiency of ionomeric polymer/conductive network composite electromechanical actuators by thickness control, Sheng Liu, Minren Lin, Yang Liu, Qiming Zhang, Wenjuan Liu, Ralph H. Colby, The Pennsylvania State Univ. (United States); Vaibhav Jain, Reza Montazami, Randy Heflin, Virginia Polytechnic Institute and State Univ. (United States) [7287-33]</p> <p>11:50 am: Characterization of ionic polymer gel actuators and their optimization, Choonghee Jo, Hani E. Naguib, Roy Kwon, Univ. of Toronto (Canada) [7287-34]</p> <p>Lunch/Exhibition Break 12:10 to 1:30 pm</p>	<p style="text-align: center;">SESSION 16</p> <p style="text-align: center;">Room: Sunrise Wed. 10:40 am to 12:00 pm</p> <p style="text-align: center;">Integrated Systems <i>Session Chairs: William W. Clark, Univ. of Pittsburgh; Aditi Chattopadhyay, Arizona State Univ.</i></p> <p>10:40 am: Integrated design and analysis of smart actuators for hybrid assistive knee braces, Hongtao Guo, Wei-Hsin Liao, The Chinese Univ. of Hong Kong (Hong Kong, China) [7288-67]</p> <p>11:00 am: Advanced control techniques for post-buckled precompressed (PBP) flight control actuators, Mark Groen, Michiel Van Schravendijk, Technische Univ. Delft (Netherlands); Ronald M. Barrett, Roelof Vos, The Univ. of Kansas (United States) [7288-68]</p> <p>11:20 am: Optimization of thermoelectric modules based on Mg-Si system, Hee-Seok Kim, Miseon Choi, Minoru Taya, Univ. of Washington (United States) [7288-69]</p> <p>11:40 am: Developments of smart mechanical material systems by innovative processing and design, Hiroshi Asanuma, Chiba Univ. (Japan) [7288-70]</p> <p>Lunch/Exhibition Break 12:00 to 1:30 pm</p>	<p style="text-align: center;">SESSION 8</p> <p style="text-align: center;">Room: Pacific Salon IV-V Wed. 10:40 am to 12:00 pm</p> <p style="text-align: center;">Active Nanocomposites I: Electromechanical Response of Carbon Nanotube-Polymer Composites <i>Session Chair: Pavel M. Chaplya, Sandia National Labs.</i></p> <p>10:40 am: A macroscopic model for carbon nanotube infused polyimides, Heather L. Wilson, Ralph C. Smith, North Carolina State Univ. (United States); Zoubeida Ounaies, Sumanth Banda, Texas A&M Univ. (United States) [7289-39]</p> <p>11:00 am: Polymer nanocomposites as electrostrictive materials, Sujay J. Deshmukh, Zoubeida Ounaies, Texas A&M Univ. (United States); Ramanan Krishnamoorti, Univ. of Houston (United States) [7289-40]</p> <p>11:20 am: Piezoresistive behavior of CNT nanocomposites using atomistic and micromechanics models, Dimitris A. Saravanos, Theodosios C. Theodosiou, Univ. of Patras (Greece) [7289-41]</p> <p>11:40 am: Ferroelectric and piezoelectric properties of PVDF/MWCNT nocomposites for actuator application, Soon Man Hong, Chong Min Koo, Gwang Ho Kim, Korea Institute of Science and Technology (Korea, Republic of) [7289-42]</p> <p>Lunch/Exhibition Break 12:00 to 1:30 pm</p>	<p style="text-align: center;">SESSION 9</p> <p style="text-align: center;">Room: Pacific Salon VI/VII Wed. 10:40 am to 12:20 pm</p> <p style="text-align: center;">Wireless System and Network <i>Session Chair: Srinivasan Ramaswamy, Univ. of Arkansas at Little Rock</i></p> <p>10:40 am: Wireless power transmission for medical applications (Invited Paper), Kyo D. Song, Norfolk State Univ. (United States); Josh Payne, Massachusetts Institute of Technology (United States); Sang Y. Yang, Jaehwan Kim, Inha Univ. (Korea, Republic of); Sang H. Choi, NASA Langley Research Ctr. (United States) [7291-32]</p> <p>11:00 am: A system of systems framework for performance modeling and analysis of mobility in wireless systems network, Srinivasan Ramaswamy, Univ. of Arkansas at Little Rock (United States) [7291-33]</p> <p>11:20 am: Investigation on performance of bio-compatible cellulose paper rectennas (Invited Paper), Kyo D. Song, Frances R. Williams, Norfolk State Univ. (United States); Sang Y. Yang, Jaehwan Kim, Inha Univ. (Korea, Republic of) [7291-34]</p> <p>11:40 am: Analysis and design of ferroelectric-based smart antenna structures, Prashanth Ramesh, Gregory N. Washington, The Ohio State Univ. (United States) [7291-35]</p> <p>12:00 pm: Wireless nanosensor network systems, Ashwin K. Whitchurch, Jose K. Abraham, P. S. Pandian, J. K. Radhakrishnan, Vijay K. Varadan, Univ. of Arkansas (United States) [7291-36]</p> <p style="text-align: center;">• Conference 7291 End.</p>

Conference 7292

Sessions 15 and 19 run concurrently

SESSION 15

Room: Royal Palm I
Wed. 10:40 am to 12:00 pm

Modeling and Mechanics II

Session Chairs: **Lizhi Sun**, Univ. of California, Irvine; **Francesco Lanza di Scalea**, Univ. of California, San Diego

10:40 am: **Dynamic mechanical analysis of magnetorheological smart nanocomposites**, Rui Liu, Lizhi Sun, Univ. of California, Irvine (United States)[7292-65]

11:00 am: **Finite element modelling of fibre Bragg grating sensors and experimental validation**, Shoaib A. Malik, Surya D. Pandita, Liwei Wang, David Collins, G. F. Fernando, The Univ. of Birmingham (United Kingdom) . . [7292-66]

11:20 am: **Modeling high-frequency wave propagation in rail tracks for crack detection**, Stefano Coccia, Ivan Bartoli, Francesco Lanza di Scalea, Univ. of California, San Diego (United States); Mahmood A. Fateh, Federal Railroad Administration (United States) . . [7292-67]

11:40 am: **Nonlinear identification of base-isolated buildings by reverse path method**, Liyu Xie, Akira Mita, Keio Univ. (Japan) [7292-68]

Lunch/Exhibition Break . 12:00 to 1:30 pm

SESSION 19

Room: Royal Palm II
Wed. 10:40 am to 12:00 pm

Piezoelectric and Integrated Sensors

Session Chairs: **Xiaoqi Bao**, Jet Propulsion Lab.; **Dineshkumar Harursampath**, Indian Institute of Science (India)

10:40 am: **High temperature piezoelectric drill**, Xiaoqi Bao, James Scott, Kate Boudreau, Yoseph Bar-Cohen, Stewart Sherrit, Mircea Badescu, Jet Propulsion Lab. (United States); Tom R. ShROUT, Shujun Zhang, The Pennsylvania State Univ. (United States) [7292-82]

11:00 am: **Different types of piezoceramic-structure interaction models using electro mechanical impedance technique**, Kiran K. K. Annamdas, Univ. of Miami (United States); Venu G. M. Annamdas, Univ. of Pittsburgh (United States) [7292-83]

11:20 am: **Optimal actuator design for piezoelectric structures based on analytical computations and measurement data**, Thomas Rittenschöber, Andreas Dantele, Profactor Produktionsforschungs GmbH (Austria) [7292-84]

11:40 am: **Asymptotically correct micromechanical model for non-linear behavior of piezo-fiber reinforced composites**, Srikant S. Padhee, Dineshkumar K. Harursampath, Indian Institute of Science (India) [7292-85]

Lunch/Exhibition Break . 12:00 to 1:30 pm

Conference 7293

SESSION 8 continued

Room: Royal Palm III
Wed. 9:10 to 11:20 am

10:40 am: **An online ultrasonic nondestructive evaluation system for spot welding in the automotive industry**, Nina Athi, Stephen R. Wylie, Jeff D. Cullen, Mohamad A. Al-Jader, Ahmed I. Al-Shamma'a, Andrew Shaw, Liverpool John Moores Univ. (United Kingdom) . [7293-35]

11:00 am: **Experimental and computer simulations results of the spot welding process using SORPAS software**, Mohamad A. Al-Jader, Liverpool John Moores Univ. (United Kingdom) . [7293-36]

SESSION 9

Room: Royal Palm III
Wed. 11:20 am to 12:00 pm

Optical Sensors I

Session Chair: **Wolfgang Ecke**, IPHT Jena (Germany)

11:20 am: **Specialty fibers for discrete and distributed sensing application**, Joohyun Koh, Kevin W. Bennett, Randy Bennett, Xin Chen, Ching-kee Chien, Ming-Jun Li, Daniel A. Nolan, Corning Inc. (United States) [7293-37]

11:40 am: **Large-scale strain monitoring based on the technique of combining BOTDA and FBG on one optical fiber**, Zhi Zhou, Harbin Institute of Technology (China) [7293-38]

Lunch/Exhibition Break . 12:00 to 1:30 pm

Conference 7294

SESSION 9

Room: Royal Palm VI
Wed. 10:40 am to 12:00 pm

Fiber Optic Sensing Technologies II

Session Chairs: **Farhad Ansari**, Univ. of Illinois, Chicago; **Yang Wang**, Georgia Institute of Technology

10:40 am: **Sensitivity enhancement of fiber optic FBG sensor for acoustic emission**, Dae-Cheol Seo, Dong-Jin Yoon, Il-Bum Kwon, Seung-Seok Lee, Korea Research Institute of Standards and Science (Korea, Republic of) [7294-44]

11:00 am: **Damage propagation monitoring of composite blade under fatigue loading**, Wensong Zhou, Hui Li, Harbin Institute of Technology (China) [7294-45]

11:20 am: **Measurement of surface resistivity/conductivity of Si wafer by optical interferometry techniques**, Khaled J. Habib, Kuwait Institute for Scientific Research (Kuwait) [7294-46]

11:40 am: **Cracking monitoring by FBG strain sensor in the ice loading on bridge pier model**, Dandan Zhang, Hong-Nan Li, Dalian Univ. of Technology (China)[7294-47]

Lunch/Exhibition Break . 12:00 to 1:30 pm

Conference 7295

Sessions 9 and 13 run concurrently

SESSION 9

Room: Royal Palm V
Wed. 10:40 am to 12:00 pm

Guided Waves for SHM V: Sensor Array

Session Chairs: **Jennifer E. Michaels**, Georgia Institute of Technology; **Paul D. Wilcox**, Univ. of Bristol (United Kingdom)

10:40 am: **Sensor arrays for structural health monitoring with ultrasonic guided waves**, Cliff J. Lissenden, Fei Yan, Joseph L. Rose, The Pennsylvania State Univ. (United States) [7295-72]

11:00 am: **Adaptive imaging of damage from changes in guided wave signals recorded from spatially distributed arrays**, Jennifer E. Michaels, James S. Hall, Thomas E. Michaels, Georgia Institute of Technology (United States) [7295-73]

11:20 am: **Lamb wave dispersion compensation in piezoelectric wafer active sensor phased-array applications**, Buli Xu, Lingyu Yu, Victor Giurgiutiu, Univ. of South Carolina (United States) . . [7295-74]

11:40 am: **Structural health monitoring of plates with surface features using guided ultrasonic waves**, Paul Fromme, Univ. College London (United Kingdom)[7295-75]

Lunch/Exhibition Break . 12:00 to 1:30 pm

SESSION 13

Room: Royal Palm IV
Wed. 10:40 am to 12:00 pm

Signal Processing for SHM

Session Chairs: **Wei-Chih Wang**, Univ. of Washington; **Jerome P. Lynch**, Univ. of Michigan

10:40 am: **Efficient signal processing for impedance-based structural health monitoring**, Megan K. O'Brien, Stuart G. Taylor, Erik A. Moro, Kevin M. Farinholt, Gyuhae Park, Charles R. Farrar, Los Alamos National Lab. (United States) [7295-05]

11:00 am: **Online three-point frequency tracking method for structural health monitoring**, Perngjin F. Pai, Aaron J. Rosengren, Univ. of Missouri (United States) [7295-06]

11:20 am: **A novel dimensional reduction approach for structural damage diagnosis using feature similarity**, Israel Lopez, Nesrin Sarigul-Klijn, Univ. of California, Davis (United States) . [7295-07]

11:40 am: **Bivariate regressive adaptive index for structural health monitoring: experimental verification**, Su Su, Univ. of Notre Dame (United States) [7295-08]

Lunch/Exhibition Break . 12:00 to 1:30 pm

Conference 7286	Conference 7287	Conference 7288	Conference 7289
<p style="text-align: center;">SESSION 4</p> <p style="text-align: center;">Room: Sunset Wed. 1:30 to 5:00 pm</p> <p style="text-align: center;">Control of Smart Structures <i>Session Chair: Jeffrey R. Hill, Univ. of Michigan</i></p> <p>1:30 pm: Position control of shape memory alloy actuators with load and frequency dependent hysteresis characteristics, Jeffrey R. Hill, Jin-Ho Roh, Kon-Well Wang, Univ. of Michigan (United States) [7286-10]</p> <p>1:50 pm: Adaptive control design for hysteretic smart systems, Xiang Fan, Ralph C. Smith, North Carolina State Univ. (United States) [7286-11]</p> <p>2:10 pm: Reduced-order model design for nonlinear smart system models, Stephen F. May, Ralph C. Smith, North Carolina State Univ. (United States) [7286-12]</p> <p>2:30 pm: Statistical emulator construction for nonlinear smart systems, Francesca D. Reale-Levis, Ralph C. Smith, North Carolina State Univ. (United States) [7286-13]</p> <p>2:50 pm: Development of model-based multispectral controllers for smart material systems, Byeongil Kim, The Ohio State Univ. Medical Ctr. (United States); Gregory N. Washington, The Ohio State Univ. (United States) [7286-14]</p> <p>Coffee Break. 3:10 to 3:40 pm</p>	<p style="text-align: center;">SESSION 8</p> <p style="text-align: center;">Room: Pacific Salon I-III Wed. 1:30 to 3:10 pm</p> <p style="text-align: center;">Ionic EAP Based on IPMC, CNT, and CP <i>Session Chairs: Qiming Zhang, The Pennsylvania State Univ.; Kwang J. Kim, Univ. of Nevada, Reno</i></p> <p>1:30 pm: Cellulose electro-active paper: actuator, sensor, and beyond, Jaehwan Kim, Sang Yeol Yang, Gyu-Young Yun, Sangdong Jang, Kiju Yun, Inha Univ. (Korea, Republic of) [7287-35]</p> <p>1:50 pm: Electromechanical performance and membrane stability of novel ionic polymer transducers constructed in the presence of ionic liquids, Andrew J. Duncan, Donald J. Leo, Timothy E. Long, Virginia Polytechnic Institute and State Univ. (United States); Barbar J. Akle, Lebanese American Univ. (Lebanon); Jong K. Park, Robert B. Moore, Virginia Polytechnic Institute and State Univ. (United States) [7287-36]</p> <p>2:10 pm: In-vitro investigations of a pH- and ionic strength-responsive polyelectrolytic hydrogel using a piezoresistive microsensor, Volker Schulz, Margarita Guenther, Gerald U. Gerlach, Technische Univ. Dresden (Germany); Jules J. Magda, Prashant Tathireddy, Loren Rieth, Florian Solzbacher, The Univ. of Utah (United States) [7287-37]</p> <p>2:30 pm: Solid electrolytes for CNT-based actuators, Johannes Riemenschneider, Sebastian Geier, Thorsten Mahrholz, Jürgen Mosch, Hans Peter Monner, Michael Sinapius, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany) [7287-38]</p> <p>2:50 pm: Development and characterization of porous polypyrrole-poly(lactic acid) electroactive polymer blends, Christine Chan, Ellen Chan, Hani E. Naguib, Univ. of Toronto (Canada) [7287-39]</p> <p>Coffee Break. 3:10 to 3:40 pm</p>	<p style="text-align: center;">SESSION 17</p> <p style="text-align: center;">Room: Sunrise Wed. 1:30 to 3:10 pm</p> <p style="text-align: center;">Passive and Active Vibration I <i>Session Chairs: Seung Jo Kim, Seoul National Univ. of Technology (Korea, Republic of)</i></p> <p>1:30 pm: Low energy multimodal semi-active control minimizing the number of transducers, Luc Gaudiller, Stéphanie Harari, Claude L. Richard, Institut National des Sciences Appliquées de Lyon (France) [7288-72]</p> <p>1:50 pm: Enhanced piezoelectric voltage build-up for semi-active control, Stéphanie Harari, Claude L. Richard, Luc Gaudiller, Institut National des Sciences Appliquées de Lyon (France) [7288-73]</p> <p>2:10 pm: Hybrid active/semi-active modal control of smart structures, Stéphanie Harari, Luc Gaudiller, Claude L. Richard, Institut National des Sciences Appliquées de Lyon (France) [7288-74]</p> <p>2:30 pm: Light weight polarized polypropylene foam for noise shielding, Travis J. Zelfer, Umesh A. Korde, South Dakota School of Mines and Technology (United States) [7288-75]</p> <p>2:50 pm: Corrosion-enabled powering approach for structural health monitoring sensor networks, Scott A. Ouellette, David L. Mascarenas, Michael D. Todd, Univ. of California, San Diego (United States) [7288-76]</p> <p>Coffee Break. 3:10 to 3:40 pm</p>	<p style="text-align: center;">SESSION 9</p> <p style="text-align: center;">Room: Pacific Salon IV-V Wed. 1:30 to 2:50 pm</p> <p style="text-align: center;">Active Nanocomposites II: Processing Issues and Multifunctional Response <i>Session Chair: Henry A. Sodano, Arizona State Univ.</i></p> <p>1:30 pm: Energy absorbing hybrid nano-composite materials, Jae-Soon Jang, Joshua Varischetti, Jonghwan Suhr, Univ. of Nevada, Reno (United States) [7289-43]</p> <p>1:50 pm: Modeling and experimental character of damping property of carbon nanofiber reinforced composites under various vibration frequencies, Huigang Xiao, Harbin Institute of Technology (China); Gangbing Song, Yong Yu, Li Sun, Univ. of Houston (United States) [7289-44]</p> <p>2:10 pm: Investigation of aspect ratio on the electroelastic properties of nanocomposites, Clark C. Andrews, Yirong Lin, Henry A. Sodano, Arizona State Univ. (United States) [7289-45]</p> <p>2:30 pm: Characterization of ferrogels formed using ferrite and magnetite nanoparticles, Kamlesh K. Suthar, Muralidhar K. Ghantasala, Western Michigan Univ. (United States); Derrick C. Mancini, Jan Ilavsky, Argonne National Lab. (United States) [7289-47]</p> <p>Coffee Break. 2:50 to 3:20 pm</p>

Conference 7292

Sessions 16 and 20 run concurrently

SESSION 16

Room: Royal Palm I
Wed. 1:30 to 3:10 pm

Piezo Sensors and Guided Wave Methods

Session Chairs: **Xiong Yu**, Case Western Reserve Univ.; **Jung-Wuk Hong**, Michigan State Univ.

1:30 pm: **Optimizing spring load restrictions by innovative sensors**, Xiong Yu, Case Western Reserve Univ. (United States) [7292-69]

1:50 pm: **A numerical study of wave propagation excited by a Lamb wave phased array**, Jung-Wuk Hong, Michigan State Univ. (United States) [7292-70]

2:10 pm: **Nonlinear ultrasonic guided waves for stress monitoring in prestressing tendons for post-tensioned concrete structures**, Ankit Srivastava, Ivan Bartoli, Salvatore Salamone, Robert R. Phillips, Claudio Nucera, Francesco Lanza di Scalea, Univ. of California, San Diego (United States); Charles S. Sikorsky, California State Dept. of Transportation (United States) [7292-71]

2:30 pm: **Application of a baseline-free damage detection technique to complex structures**, Chang Gil Lee, Korea Advanced Institute of Science and Technology (Korea, Republic of); Seung Bum Kim, Carnegie Mellon Univ. (United States); Hoon Sohn, Korea Advanced Institute of Science and Technology (Korea, Republic of) [7292-72]

2:50 pm: **Application of reusable PZT sensors for monitoring initial hydration of concrete**, Bahador Sabet Divsholi, Yaowen Yang, Nanyang Technological Univ. (Singapore) [7292-73]

Coffee Break. 3:10 to 3:40 pm

SESSION 20

Room: Royal Palm II
Wed. 1:30 to 2:50 pm

Smart Materials and Systems II

Session Chairs: **Daniele Zonta**, Univ. degli Studi di Trento (Italy); **Hwan-Sik Yoon**, Tennessee Technological Univ.

1:30 pm: **Robust gain-scheduling for smart structures in parallel robots**, Stephan Algermissen, Michael Rose, Ralf Keimer, Michael Sinapius, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany)[7292-86]

1:50 pm: **Vehicle positioning using image processing**, Amardeep Kaur, Steve E. Watkins, Theresa M. Swift, Missouri Univ. of Science and Technology (United States) [7292-87]

2:10 pm: **Investigation on thermo-mechanical behaviors of shape memory thin-walled tube**, Haibao Lu, Bo Zhou, Harbin Institute of Technology (China) [7292-88]

2:30 pm: **A new design concept for multifunctional fasteners using smart materials**, Hwan-Sik Yoon, Tennessee Technological Univ. (United States)[7292-89]

Coffee Break. 2:50 to 3:20 pm

Conference 7293

SESSION 10

Room: Royal Palm III
Wed. 1:30 to 3:30 pm

Optical Sensors II

1:30 pm: **Shape reconstruction of composite structures with monitoring of modeling changes using Brillouin scattering-based distributed optical fiber strain sensor network**, Mayuko Nishio, The Univ. of Tokyo (Japan); Nobuo Takeda, The Univ. of Tokyo Graduate School of Frontier Sciences (Japan) [7293-39]

1:50 pm: **Tunnel deformation monitoring method based on distributed optical fiber sensing technique**, Sheng Shen, Southeast Univ. (China); Zhishen Wu, Ibaraki Univ. (China); Caiqian Yang, Yongsheng Tang, Wan Hong, Yu Zhang, Southeast Univ. (China) [7293-40]

2:10 pm: **BOTDA road-embedded strain sensing system for landslide boundary evaluation**, Michael R. Iten, Alexander M. Puzrin, ETH Zürich (Switzerland) [7293-41]

2:30 pm: **A new type of smart hybrid FRP bar for civil engineering**, Yongsheng Tang, Southeast Univ. (China); Zhishen Wu, Ibaraki Univ. (Japan); Caiqian Yang, Sheng Shen, Wan Hong, Yu Zhang, Southeast Univ. (China) [7293-42]

2:50 pm: **Electric-field sensor array from cavity resonance between optical D-fiber and multiple slab waveguides**, Richard S. Gibson, Richard Selfridge, Stephen M. Schultz, Brigham Young Univ. (United States) [7293-44]

3:10 pm: **Monitoring and modelling the diffusion profile in a thermosetting resin**, Ramani S. Mahendran, Rongsheng Chen, Stephen N. Kukureka, Gerard F. Fernando, The Univ. of Birmingham (United Kingdom) [7293-45]

• Conference 7293 End.

Conference 7294

SESSION 10

Room: Royal Palm VI
Wed. 1:30 to 3:10 pm

Wireless Sensor Networks

Session Chairs: **Ming Wang**, Northeastern Univ.; **Ying Zhang**, Georgia Institute of Technology, Savannah

1:30 pm: **Experimental study on the behavior of segmented buried concrete pipelines subject to ground movements**, Junhee Kim, Jerome P. Lynch, Univ. of Michigan (United States) [7294-36]

1:50 pm: **Mobile wireless sensor networks for structural damage detection**, Yang Wang, Kok-Meng Lee, Georgia Institute of Technology (United States) [7294-37]

2:10 pm: **Development of smart joint sensing system for building safety**, Howard Chung, Shawn Beard, David C. Zhang, Acellent Technologies, Inc. (United States) [7294-38]

2:30 pm: **Structural health monitoring of co-cured composite pi-joint, with and without Z-pinning, under fatigue loading**, Hitesh Kapoor, Virginia Polytechnic Institute and State Univ. (United States) [7294-39]

2:50 pm: **Residual stress measurements for localized stress evaluation at electronic components and MEMS/NEMS**, Jürgen Keller, AMIC GmbH (Germany); Astrid Gollhardt, Dietmar W. Vogel, Fraunhofer-Institut für Zuverlässigkeit und Mikrointegration (Germany); N. Sabate, Univ. Autònoma de Barcelona (Spain); Bernd Michel, Fraunhofer-Institut für Zuverlässigkeit und Mikrointegration (Germany) [7294-40]

Coffee Break. 3:10 to 3:30 pm

Conference 7295

Sessions 10 and 14 run concurrently

SESSION 10

Room: Royal Palm V
Wed. 1:30 to 3:10 pm

Guided Waves for SHM VI: Nonlinear, Time Reversal, and Other Novel Techniques

Session Chairs: **Paul D. Wilcox**, Univ. of Bristol (United Kingdom); **Jennifer E. Michaels**, Georgia Institute of Technology

1:30 pm: **Stress detection with guided acoustic ultrasonic waves by non-linear elastic and geometric effects**, Khurram S. Tarar, R. Meier, Wolfgang Grill, Univ. Leipzig (Germany) [7295-76]

1:50 pm: **On the existence of antisymmetric or symmetric Lamb waves at non linear higher harmonics**, Ankit Srivastava, Francesco Lanza di Scalea, Univ. of California, San Diego (United States) [7295-77]

2:10 pm: **Evaluation of guided EM wave scour monitoring system**, Xiong Yu, Case Western Reserve Univ. (United States) [7295-78]

2:30 pm: **Frequency domain reference-free crack detection using transfer impedances in plate structures**, Seunghee Park, Chang-Gil Lee, Hoon Sohn, Korea Advanced Institute of Science and Technology (Korea, Republic of) [7295-79]

2:50 pm: **Identification and parameter estimation of corrosion in metallic plate structure using a Lamb wave sensor/actuator network**, Vivek T. Rathod, Debiprosad Roy Mahapatra, Srinivas Gopalakrishnan, Indian Institute of Science (India) [7295-80]

Coffee Break. 3:10 to 3:40 pm

SESSION 14

Room: Royal Palm IV
Wed. 1:30 to 3:10 pm

SHM for Biomedical Applications

Session Chairs: **Paul D. Panetta**, Luna Innovations Inc.; **Won-Bae Na**, Pukyong National Univ. (Korea, Republic of)

1:30 pm: **Designing an optical bendloss sensor for clinical force measurement**, Wei-Chih Wang, Univ. of Washington (United States) [7295-14]

1:50 pm: **Improvements in medical CT image reconstruction accuracy in the presence of metal objects by using x-rays up to 1 MeV**, James E. Clayton, Varian Medical Systems (United States) [7295-15]

2:10 pm: **Monitoring of variations in the speed of sound in contracting and relaxing muscle**, Muhammad Zakir Hossain, Wolfgang Grill, Univ. Leipzig (Germany) [7295-16]

2:30 pm: **Design of a MEMS sensor as a support feature for the Ni-Tinol shape memory alloy (SMA) implantation into the human ear cochlea**, Christopher Najera-Vilchis, Jose A. Alvarez-Chavez, Fernando Martinez-Piñon, Jorge Garcia-Becerra, Instituto Politécnico Nacional (Mexico) [7295-17]

2:50 pm: **PZR transducer for monitoring blood pressure**, Abraham Sotelo-Aguilar, Fernando Martinez-Piñon, Jose A. Alvarez-Chavez, Instituto Politécnico Nacional (Mexico) [7295-18]

Coffee Break. 3:10 to 3:40 pm

Conference 7286	Conference 7287	Conference 7288	Conference 7289
<p>SESSION 4 continued</p> <p>Room: Sunset Wed. 1:30 to 5:00 pm</p> <p>3:40 pm: Nonlinear control of non-minimal tensegrity models, Robert E. Skelton, Univ. of California, San Diego (United States) [7286-15]</p> <p>4:00 pm: Electrostatic control with discrete area variation for beam steering and focusing using membrane mirrors, Miles A. Wickersham, Brian C. Fehrman, Lisa K. Robinson, Andrew Downs, Umesh A. Korde, South Dakota School of Mines and Technology (United States) [7286-16]</p> <p>4:20 pm: Viscoelastic phoenology based variational structure assignment for vibration control: closed-loop control of a beam with sensors and actuators, Debiprosad Roy Mahapatra, G. K. Vadiraja, Indian Institute of Science (India) [7286-17]</p> <p>4:40 pm: Vibration control of a thin-walled composite beam using sliding mode control, T. C. Manjunath, East West Institute of Technology (India) [7286-18]</p>	<p>SESSION 9</p> <p>Room: Pacific Salon I-III Wed. 3:40 to 6:00 pm</p> <p>Modeling and Analysis of EAP <i>Session Chairs: Jinsong Leng</i>, Harbin Institute of Technology (China); Zhigang Suo, Harvard Univ.</p> <p>3:40 pm: Nonlinear capacitance of ionic polymer-metal composites, Zheng Chen, Dawn Hedgepeth, Xiaobo Tan, Michigan State Univ. (United States) [7287-40]</p> <p>4:00 pm: Modeling dynamics of underwater vehicles actuated by ionic polymer metal composite (IPMC) actuators, Shivakanth Gutta, WooSoon Yim, Mohamed B. Trabia, Univ. of Nevada, Las Vegas (United States) [7287-41]</p> <p>4:20 pm: Hysteresis modeling of a core-free EAP tubular actuator, Rahimullah Sarban, Jakob Oubaek, Richard W. Jones, Southern Denmark Univ. (Denmark) [7287-42]</p> <p>4:40 pm: Is Maxwell stress enough?: electrostriction in dielectric elastomer, Xuanhe Zhao, Zhigang Suo, Harvard Univ. (United States) [7287-43]</p> <p>5:00 pm: Stability analysis of dielectric elastomer using the elastic strain energy function with two material constants, Liwu Liu, Zhen Zhang, Liang Shi, Gang Deng, Yanju Liu, Jinsong Leng, Harbin Institute of Technology (China) [7287-44]</p> <p>5:20 pm: Capacitance boost in ionic polymer metal composites due to electrode surface roughness, Matteo Aureli, Weiyang Lin, Maurizio Porfiri, Polytechnic Institute of New York Univ. (United States) [7287-45]</p> <p>5:40 pm: A comprehensive model on the actuation of ionic polymer-metal composites, Lei Zhang, Yaowen Yang, Nanyang Technological Univ. (Singapore) [7287-46]</p>	<p>SESSION 18</p> <p>Room: Sunrise Wed. 3:40 to 5:00 pm</p> <p>Passive and Active Vibration II <i>Session Chairs: Wei-Hsin Liao</i>, The Chinese Univ. of Hong Kong (Hong Kong, China);</p> <p>3:40 pm: Shaking table test study on active optimal control of SSI system, Fengxia Wang, Harbin Institute of Technology (China); Jinping Ou, Dalian Univ. of Technology (China) [7288-77]</p> <p>4:00 pm: Vibration cancellation in a plate by orthogonal eigenstructure control, Mohammad Rastgaar Aagaah, Mehdi Ahmadian, Steve C. Southward, Virginia Polytechnic Institute and State Univ. (United States) [7288-78]</p> <p>4:20 pm: Pushover analysis method for asymmetric structure with passive energy dissipation devices, Gang Li, Hong-Nan Li, Dalian Univ. of Technology (China) [7288-79]</p> <p>4:40 pm: Analysis and full-scale test on energy absorption capability of all-steel buckling-restrained brace, Ning Ma, Bin Wu, Hui Li, Harbin Institute of Technology (China); JinPing Ou, Dalian Univ. of Technology (China) [7288-80]</p>	<p>SESSION 10</p> <p>Room: Pacific Salon IV-V Wed. 3:20 to 6:20 pm</p> <p>Active Polymers <i>Session Chair: Marcelo J. Dapino</i>, The Ohio State Univ.</p> <p>3:20 pm: Dynamic surface resistance model of IPMC, Deivid Pugal, Univ. of Nevada, Reno (United States) and Univ. of Tartu (Estonia); Alvo Aabloo, Univ. of Tartu (Estonia); Kwang J. Kim, Univ. of Nevada, Reno (United States) [7289-48]</p> <p>3:40 pm: Micromechanical modeling of ionic liquid-swollen ionic polymer transducers, Jacob D. Davidson, Nakhiah C. Goulbourne, Virginia Polytechnic Institute and State Univ. (United States) [7289-49]</p> <p>4:00 pm: 3-dimensional energy harvesting using disc IPMC, Rashi Tiwari, Kwang J. Kim, Univ. of Nevada, Reno (United States) [7289-50]</p> <p>4:20 pm: Electro-mechanical analysis of a dielectric EAP actuator, Alexander York, Stefan S. Seelecke, North Carolina State Univ. (United States) [7289-51]</p> <p>4:40 pm: Observation of creep behavior of cellulose Electro-Active Paper(EAPap) actuator, Joo-Hyung Kim, Sang-woo Lee, Gyu-Young Yun, Inha Univ. (Korea, Republic of); Chulho Yang, Andong National Univ. (Korea, Republic of); Heung Soo Kim, Catholic Univ. of Daegu (Korea, Republic of); Jaehwan Kim, Inha Univ. (Korea, Republic of) [7289-52]</p> <p>5:00 pm: A study of optimal fabricating conditions for electrospinning of cellulose and CNT-cellulose nanofibers for smart applications, Alex Pankonien, Zoubeida Ounaies, Texas A&M Univ. (United States); Chulho Yang, Andong National Univ. (Korea, Republic of) [7289-53]</p> <p>5:20 pm: Covalently bonded functionalized multi-walled carbon nanotubes and cellulose for electroactive paper actuator, Sungryul Yun, Jaehwan Kim, Kiju Yun, Inha Univ. (Korea, Republic of) [7289-54]</p> <p>5:40 pm: A computational model for domain structure evolution of nematic phase liquid crystal elastomers, Hongbo Wang, William S. Oates, Florida State Univ. (United States) [7289-55]</p> <p>6:00 pm: Constructing effective healable polymer composites, Christian Nielsen, Alireza V. Amirkhizi, Slavouche Nemat-Nasser, Univ. of California, San Diego (United States) [7289-56]</p>

Conference 7292

Sessions 17 and 21 run concurrently

SESSION 17

Room: Royal Palm I
Wed. 3:40 to 5:20 pm

Piezo Sensors and Applications

Session Chairs: **Shi Yan**, Shenyang Jianzhu Univ. (China); **Haeng-Ki Lee**, Korea Advanced Institute of Science and Technology (Korea, Republic of)

3:40 pm: **Monitoring hardening and strength gain of concrete using EMI sensing technique**, Haeng-Ki Lee, Rudy Tawie, Korea Advanced Institute of Science and Technology (Korea, Republic of) [7292-74]

4:00 pm: **Bonded piezoelectric AE sensors for structural health monitoring application**, Mannur J. Sundaresan, North Carolina A&T State Univ. (United States) [7292-75]

4:20 pm: **Health monitoring of concrete structures using embedded piezoceramic transducers based electromechanical impedance model**, Venu G. Annamdas, Univ. of Pittsburgh (United States); Annamdas Radhika, Jawaharlal Nehru Technological Univ. (India); Chee Kiong Soh, Nanyang Technological Univ. (Singapore) [7292-76]

4:40 pm: **Experimental research on signals of positive structural health monitoring for concrete structure based on PZT transducers**, Wei Sun, Dalian Univ. of Technology (China) and Shenyang Jianzhu Univ. (China); Shi Yan, Shenyang Jianzhu Univ. (China) [7292-77]

5:00 pm: **Easy installation method of piezoceramic (PZT) transducers for health monitoring of structures using electro-mechanical impedance technique**, Venu G. M. Annamdas, Univ. of Pittsburgh (United States); Annamdas M. Radhika, Jawaharlal Nehru Technological Univ. (India); Yaowen Yang, Nanyang Technological Univ. (Singapore) [7292-78]

SESSION 21

Room: Royal Palm II
Wed. 3:20 to 5:40 pm

Novel Sensors III

Session Chair: **Alison B. Flatau**, Univ. of Maryland, College Park

3:20 pm: **Tunable mechanical monolithic horizontal accelerometer for low frequency seismic noise measurement**, Fabrizio Barone, Istituto Nazionale di Fisica Nucleare (Italy); Fausto Acernese, Univ. degli Studi di Salerno (Italy); Gerardo Giordano, Univ. degli Studi di Napoli Federico II (Italy); Rocco Romano, Univ. degli Studi di Salerno (Italy); Rosario De Rosa, Univ. degli Studi di Napoli Federico II (Italy) [7292-90]

3:40 pm: **Fatigue crack growth monitoring at elevated temperatures using multiplexed fiber Bragg gratings**, Richard J. Black, David J. Zare, Levy Oblea, Behzad M. Moslehi, Intelligent Fiber Optic Systems Inc. (United States); Shamachary Sathish, Norman Schell, Univ. of Dayton Research Institute (United States); Kumar V. Jata, Craig L. Neslen, Mark P. Blodgett, Air Force Research Lab. (United States) [7292-92]

4:00 pm: **Fast parallel processing fiber Bragg grating interrogators**, Richard J. Black, Behzad M. Moslehi, Intelligent Fiber Optic Systems Inc. (United States); Craig M. Lopatin, Naval Surface Warfare Ctr. (United States) [7292-93]

4:20 pm: **Scaling effects in bio-inspired directional microphones**, Haijun Liu, Xuming Zhang, Miao Yu, Univ. of Maryland, College Park (United States) [7292-95]

4:40 pm: **On nonuniform resonator sensors**, Dumitru I. Caruntu, Karen Lozano, Arturo Fuentes, The Univ. of Texas-Pan American (United States) [7292-165]

5:00 pm: **A first approach to foot motion monitoring using conductive polymer sensors**, Lina Castano, Alison B. Flatau, Univ. of Maryland, College Park (United States) [7292-172]

5:20 pm: **Normal free space coupling to fiber Bragg grating sensors**, Liang Qiu, Michael E. Teitelbaum, Keith W. Goossen, Dirk Heider, Univ. of Delaware (United States); Daniel J. O'Brien, Eric D. Wetzel, Army Research Lab. (United States) [7292-173]

Conference 7294

SESSION 11

Room: Royal Palm VI
Wed. 3:30 to 5:30 pm

Special Panel: Critical National Needs in Civil Infrastructure

Panel Moderators: **H. Felix Wu**, National Institute of Standards and Technology; **A. Emin Aktan**, Drexel Univ.

Panelists for this special session will include: **H. Felix Wu**, National Institute of Standards and Technology; **Hamid Ghasami**, Federal Highway Administration; **Paul Mlakar**, U.S. Army Engineers Research and Development Center; **Neناد Gucunski**, Rutgers University; **Sheila Duwadi**, Federal Highway Administration; **Lawrence Bank**, National Science Foundation

• Conference 7294 End.

Conference 7295

Sessions 11 and 15 run concurrently

SESSION 11

Room: Royal Palm V
Wed. 3:40 to 5:40 pm

Modeling and Simulation for SHM I

Session Chairs: **Hwai-Chung Wu**, Wayne State Univ.; **Sauvik Banerjee**, IIT (India)

3:40 pm: **Efficient finite element modelling of elastodynamic scattering**, Paul D. Wilcox, Univ. of Bristol (United Kingdom) [7295-81]

4:00 pm: **Micro interferometric acoustic lens: mesh-free modeling with experimental verification**, Tribikram Kundu, The Univ. of Arizona (United States); Dominique Placko, Ecole Normale Supérieure de Cachan (France); Tamaki Yanagita, The Univ. of Arizona (United States); Shamachary Sathish, Univ. of Dayton Research Institute (United States) [7295-82]

4:20 pm: **In-situ determination of stress intensity factors for the prediction of fatigue crack growth using piezoelectric polymer coatings**, A. Ricoeur, D. Bäcker, M. Kuna, Technische Univ. Bergakademie Freiberg (Germany) [7295-83]

4:40 pm: **Numerical modeling of frictional heating based vibrothermography**, Farid Mabrouki, National Research Council Canada (Canada); Marc Thomas, Ecole de Technologie Supérieure (Canada); Marc Genest, Abbas Fahr, National Research Council Canada (Canada) [7295-84]

5:00 pm: **Development of a mathematical model to predict the point of impact along petroleum pipelines**, Oluwafemi A. Olugboji, Newcastle Univ. (United Kingdom) [7295-85]

5:20 pm: **Quantification of sensor geometry performance for guided wave SHM**, Anthony J. Croxford, Paul D. Wilcox, Charles R. P. Courtney, Bruce W. Drinkwater, Univ. of Bristol (United Kingdom) [7295-86]

SESSION 15

Room: Royal Palm IV
Wed. 3:40 to 6:00 pm

Novel Instrumentation and Sensing for SHM II

Session Chairs: **Wolfgang Grill**, Univ. Leipzig (Germany); **Paul D. Panetta**, Luna Innovations Inc.

3:40 pm: **Layer-by-layer carbon nanotube bio-templates for cell culturing and biosensing**, Kenneth J. Loh, Jerome P. Lynch, Univ. of Michigan (United States) [7295-25]

4:00 pm: **Non-inertial ultra-wideband acoustic transducers**, U. Amjad, K. Hahn, Wolfgang Grill, Univ. Leipzig (Germany) [7295-26]

4:20 pm: **Generating EMF by using a triangular diamagnetic levitating rotor**, Wei-Chih Wang, Univ. of Washington (United States) [7295-27]

4:40 pm: **Micromachined flexible conformal ultrasound transducer arrays based on polyimide joints**, David B. Bennett, Martin O. Culjat, Univ. of California, Los Angeles (United States); Kimani Williams, Univ. of California, Santa Barbara (United States); Behnam Sharareh, Priyamvada Tewari, Univ. of California, Los Angeles (United States); Hua Lee, Elliott R. Brown, Univ. of California, Santa Barbara (United States); Warren S. Grundfest, Univ. of California, Los Angeles (United States); Rahul S. Singh, Univ. of California, Santa Barbara (United States) [7295-28]

5:00 pm: **Nonlinear piezoelectric impedance modulation and its application to crack detection**, Arata Masuda, Tomohiro Shinagawa, Daisuke Iba, Akira Sone, Kyoto Institute of Technology (Japan) [7295-29]

5:20 pm: **Wireless, passive, flexible strain sensor for structural health monitoring**, Jung-Rae Park, Sharavanan Balasubramaniam, Julie Chen, Ramaswamy Nagarajan, Univ. of Massachusetts Lowell (United States) [7295-30]

5:40 pm: **Micro viscometer**, Wei-Chih Wang, Univ. of Washington (United States) [7295-31]

<p>Announcements 8:00 to 8:05 am</p> <p>NSF Funding Agency Talk 8:05 to 8:20 am</p> <p style="text-align: center;">Current and Future Programs and Initiatives</p> <p style="text-align: center;">Donald Senich, National Science Foundation (United States)</p>	<p>Plenary Presentation 8:20 to 9:05 am</p> <p>A Paleo-aerodynamic Exploration of the Evolution of Nature's Flyers, Man's Aircraft, and the Needs and Options for Future Technology Innovations</p> <p style="text-align: center;">Brenda M. Kulfan, The Boeing Co. (United States)</p> <p style="text-align: center;"><i>Please see page 3 for more information</i></p>
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Conference 7286	Conference 7287		Conference 7288	Conference 7289		
<p style="text-align: center;">SESSION 5</p> <p style="text-align: center;">Room: Sunset Thurs. 9:30 to 11:40 am</p> <p style="text-align: center;">Health Monitoring</p> <p><i>Session Chair: Clyde K. Coelho, Arizona State Univ.</i></p> <p>9:30 am: Sensor sensitivity studies to monitor crack growth in lug joint structures, Sunilkumar O. Soni, Arizona State Univ. (United States); Santanu Das, Univ. of California, Santa Cruz (United States); Aditi Chattopadhyay, Arizona State Univ. (United States) [7286-19]</p> <p>9:50 am: Progressive transfer function estimation of a degrading structure, Subhasish Mohanty, Arizona State Univ. (United States) [7286-20]</p> <p>Coffee Break 10:10 to 10:40 am</p>	<p style="text-align: center; background-color: #333; color: white; padding: 2px;">Sessions 10, 12 and 13 run concurrently</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; background-color: #d9ead3; vertical-align: top;"> <p style="text-align: center;">SESSION 10</p> <p style="text-align: center;">Room: Pacific Salon I-III Thurs. 9:10 am to 12:00 pm</p> <p style="text-align: center;">Application of EAP to Robotics</p> <p><i>Session Chairs: Lenore Rasmussen, Ras Labs., LLC; John David W. Madden, The Univ. of British Columbia (Canada)</i></p> <p>9:10 am: Integrated tactile sensing and display device (Invited Paper), Hyouk Ryeol Choi, Huu Chuc Nguyen, Duk Sang Kim, Nguyen Huu Lam Vuong, Ja Choon Koo, Young Kwan Lee, Jae-Do Nam, Sungkyunkwan Univ. (Korea, Republic of) [7287-47]</p> <p>9:40 am: Tactile display with dielectric multilayer elastomer actuators, Marc Matysek, Peter Lotz, Helmut F. Schlaak, Technische Univ. Darmstadt (Germany) [7287-48]</p> <p>Coffee Break 10:00 to 10:30 am</p> </td> <td style="width: 50%; background-color: #d9ead3; vertical-align: top;"> <p style="text-align: center;">SESSION 12</p> <p style="text-align: center;">Room: Pacific Salon VI/VII Thurs. 9:10 to 10:10 am</p> <p style="text-align: center;">Modeling and Analysis of EAP</p> <p><i>Session Chairs: Zheng Chen, Michigan State Univ.; Alireza Vakil Amirkhizi, Univ. of California, San Diego</i></p> <p>9:10 am: A large deformation nonlinear model for conjugated polymer actuators, Yang Fang, Thomas J. Pence, Xiaobo Tan, Michigan State Univ. (United States) [7287-53]</p> <p>9:30 am: Optimization of porous membrane core morphology for polypyrrole trilayer actuators, Aaron D. Price, Hani E. Naguib, Univ. of Toronto (Canada) [7287-54]</p> <p>9:50 am: Distributed parameter system modeling of IPMC actuators with the electro-stress diffusion coupling theory, Kentaro Takagi, Takaaki Osada, Nagoya Univ. (Japan); Kinji Asaka, National Institute of Advanced Industrial Science and Technology (Japan); Yoshikazu Hayakawa, Nagoya Univ. (Japan); Zhi-Wei Luo, Kobe Univ. (Japan) [7287-55]</p> <p>Coffee Break 10:10 to 10:30 am</p> </td> </tr> </table>		<p style="text-align: center;">SESSION 10</p> <p style="text-align: center;">Room: Pacific Salon I-III Thurs. 9:10 am to 12:00 pm</p> <p style="text-align: center;">Application of EAP to Robotics</p> <p><i>Session Chairs: Lenore Rasmussen, Ras Labs., LLC; John David W. Madden, The Univ. of British Columbia (Canada)</i></p> <p>9:10 am: Integrated tactile sensing and display device (Invited Paper), Hyouk Ryeol Choi, Huu Chuc Nguyen, Duk Sang Kim, Nguyen Huu Lam Vuong, Ja Choon Koo, Young Kwan Lee, Jae-Do Nam, Sungkyunkwan Univ. (Korea, Republic of) [7287-47]</p> <p>9:40 am: Tactile display with dielectric multilayer elastomer actuators, Marc Matysek, Peter Lotz, Helmut F. Schlaak, Technische Univ. Darmstadt (Germany) [7287-48]</p> <p>Coffee Break 10:00 to 10:30 am</p>	<p style="text-align: center;">SESSION 12</p> <p style="text-align: center;">Room: Pacific Salon VI/VII Thurs. 9:10 to 10:10 am</p> <p style="text-align: center;">Modeling and Analysis of EAP</p> <p><i>Session Chairs: Zheng Chen, Michigan State Univ.; Alireza Vakil Amirkhizi, Univ. of California, San Diego</i></p> <p>9:10 am: A large deformation nonlinear model for conjugated polymer actuators, Yang Fang, Thomas J. Pence, Xiaobo Tan, Michigan State Univ. (United States) [7287-53]</p> <p>9:30 am: Optimization of porous membrane core morphology for polypyrrole trilayer actuators, Aaron D. Price, Hani E. Naguib, Univ. of Toronto (Canada) [7287-54]</p> <p>9:50 am: Distributed parameter system modeling of IPMC actuators with the electro-stress diffusion coupling theory, Kentaro Takagi, Takaaki Osada, Nagoya Univ. (Japan); Kinji Asaka, National Institute of Advanced Industrial Science and Technology (Japan); Yoshikazu Hayakawa, Nagoya Univ. (Japan); Zhi-Wei Luo, Kobe Univ. (Japan) [7287-55]</p> <p>Coffee Break 10:10 to 10:30 am</p>	<p style="text-align: center;">SESSION 19</p> <p style="text-align: center;">Room: Sunrise Thurs. 9:10 to 10:10 am</p> <p style="text-align: center;">Passive and Active Vibration III</p> <p><i>Session Chair: Mehrdad N. Ghasemi-Nejhad, Univ. of Hawai'i at Manoa</i></p> <p>9:10 am: Torsionally coupled vibration control of eccentric buildings using liquid dampers, Lin-Sheng Huo, Hong-Nan Li, Dalian Univ. of Technology (China) [7288-81]</p> <p>9:30 am: Wave absorption control of beams near fixed boundary using finite difference method, Muneharu Saigo, National Institute of Advanced Industrial Science and Technology (Japan); Hiroyuki Iwamoto, Tokyo Metropolitan Univ. (Japan); Dong-Ho Nam, Incheon City College (Korea, Republic of) [7288-82]</p> <p>9:50 am: Modal analysis and vibration control of smart hull structure in underwater, Min-Sang Seong, Oh-Chul Kwon, Jung-Woo Sohn, Seung-Bok Choi, Inha Univ. (Korea, Republic of) [7288-83]</p> <p>Coffee Break 10:10 to 10:40 am</p>	<p style="text-align: center;">SESSION 11</p> <p style="text-align: center;">Room: Pacific Salon IV-V Thurs. 9:10 to 10:10 am</p> <p style="text-align: center;">Magneto-Active Materials I: Magnetic SMAs</p> <p><i>Session Chair: Jiangyu Li, Univ. of Washington</i></p> <p>9:10 am: Mechanical behavior of magnetic shape memory alloys under biaxial magnetic loading, Constantin Ciocanel, Heidi Feigenbaum, Northern Arizona Univ. (United States) [7289-57]</p> <p>9:30 am: Magnetic field-induced reversible phase transformations in magnetic shape memory alloys, Dimitris C. Lagoudas, Bjoern Kiefer, Krishnendu Haldar, Texas A&M Univ. (United States) [7289-58]</p> <p>9:50 am: Phase transformation and magnetic-field-induced elastic behavior of NiMnGa/polymer composite, Chao-Ying Xie, Xiaogang Sun, Shanghai Jiao Tong Univ. (China) [7289-59]</p> <p>Coffee Break 10:10 to 10:40 am</p>
<p style="text-align: center;">SESSION 10</p> <p style="text-align: center;">Room: Pacific Salon I-III Thurs. 9:10 am to 12:00 pm</p> <p style="text-align: center;">Application of EAP to Robotics</p> <p><i>Session Chairs: Lenore Rasmussen, Ras Labs., LLC; John David W. Madden, The Univ. of British Columbia (Canada)</i></p> <p>9:10 am: Integrated tactile sensing and display device (Invited Paper), Hyouk Ryeol Choi, Huu Chuc Nguyen, Duk Sang Kim, Nguyen Huu Lam Vuong, Ja Choon Koo, Young Kwan Lee, Jae-Do Nam, Sungkyunkwan Univ. (Korea, Republic of) [7287-47]</p> <p>9:40 am: Tactile display with dielectric multilayer elastomer actuators, Marc Matysek, Peter Lotz, Helmut F. Schlaak, Technische Univ. Darmstadt (Germany) [7287-48]</p> <p>Coffee Break 10:00 to 10:30 am</p>	<p style="text-align: center;">SESSION 12</p> <p style="text-align: center;">Room: Pacific Salon VI/VII Thurs. 9:10 to 10:10 am</p> <p style="text-align: center;">Modeling and Analysis of EAP</p> <p><i>Session Chairs: Zheng Chen, Michigan State Univ.; Alireza Vakil Amirkhizi, Univ. of California, San Diego</i></p> <p>9:10 am: A large deformation nonlinear model for conjugated polymer actuators, Yang Fang, Thomas J. Pence, Xiaobo Tan, Michigan State Univ. (United States) [7287-53]</p> <p>9:30 am: Optimization of porous membrane core morphology for polypyrrole trilayer actuators, Aaron D. Price, Hani E. Naguib, Univ. of Toronto (Canada) [7287-54]</p> <p>9:50 am: Distributed parameter system modeling of IPMC actuators with the electro-stress diffusion coupling theory, Kentaro Takagi, Takaaki Osada, Nagoya Univ. (Japan); Kinji Asaka, National Institute of Advanced Industrial Science and Technology (Japan); Yoshikazu Hayakawa, Nagoya Univ. (Japan); Zhi-Wei Luo, Kobe Univ. (Japan) [7287-55]</p> <p>Coffee Break 10:10 to 10:30 am</p>					

Announcements 8:00 to 8:05 am

NSF Funding Agency Talk 8:05 to 8:20 am

**Current and Future Programs
and Initiatives**

Donald Senich, National Science Foundation (United States)

Plenary Presentation 8:20 to 9:05 am

**A Paleo-aerodynamic Exploration of the Evolution
of Nature's Flyers, Man's Aircraft, and the Needs
and Options for Future Technology Innovations**

Brenda M. Kulfan, The Boeing Co. (United States)

Please see page 3 for more information

Conference 7292

Sessions 22, 26 and 30 run concurrently

Conference 7295

Sessions 16 and 19 run concurrently

SESSION 22

Room: Royal Palm I
Thurs. 9:10 to 10:10 am

Application to Large Structures

Session Chairs: **Steve E. Watkins**, Missouri Univ. of Science and Technology; **Alessandro De Stefano**, Politecnico di Torino (Italy)

9:10 am: **Surveillance of pedestrian bridge traffic using neural networks**, Steve E. Watkins, Ronald J. Stanley, Anand Gopal, Randy H. Moss, Missouri Univ. of Science and Technology (United States)[7292-96]

9:30 am: **Optimal sensor placement for a super high-rise building**, Ting-Hua Yi, Sr., Dalian Univ. of Technology (China). [7292-97]

9:50 am: **Long-term structural health monitoring of the 2006 Torino's Olympic pedestrian cable-stayed bridge**, Luca M. Giacosa, Alessandro De Stefano, Politecnico di Torino (Italy). [7292-98]

Coffee Break. 10:10 to 10:40 am

SESSION 26

Room: Royal Palm II
Thurs. 9:10 to 10:10 am

System Identification and Interpretation

Session Chairs: **Jian Zhang**, Univ. of California, San Diego; **Zhili Hao**, Old Dominion Univ.

9:10 am: **A pattern recognition technique for nonlinear structural identification**, Jian Zhang, Univ. of California, San Diego (United States) [7292-114]

9:30 am: **An SOI-based tuning-fork gyroscope with high quality factors**, Zhili Hao, Old Dominion Univ. (United States) [7292-115]

9:50 am: **Application of active base isolation control**, Chia-Ming Chang, Zhihao Wang, Billie F. Spencer, Jr., Univ. of Illinois at Urbana-Champaign (United States) [7292-116]

Coffee Break. 10:10 to 10:40 am

SESSION 30

Room: Royal Palm III
Thurs. 9:10 to 10:10 am

Smart Materials and Systems III

Session Chairs: **Keith A. Williams**, The Univ. of Alabama at Tuscaloosa; **Henry Angelo Sodano**, Arizona State Univ.

9:10 am: **Dimensioning and manufacture of thermoplastic composite compatible piezoceramic modules for adaptive lightweight structures**, Thomas Heber, Werner Hufenbach, Maik Gude, Technische Univ. Dresden (Germany); Michael H. M. Schmidt, Stephan Neugebauer, Bayerisches Laserzentrum GmbH (Germany). [7292-129]

9:30 am: **Enhanced modeling of piezoelectric bimorph cantilever energy**, Long Zhang, Keith A. Williams, The Univ. of Alabama at Tuscaloosa (United States) [7292-130]

9:50 am: **Calibration and performance of laser steering system for tracking moving objects**, Alan Jennings, Chris Allen, Jonathon Black, Air Force Institute of Technology (United States) . . [7292-131]

Coffee Break. 10:10 to 10:40 am

SESSION 16

Room: Royal Palm V
Thurs. 9:10 to 10:10 am

Signal Processing and Damage Detection for SHM

Session Chairs: **Pengjin F. Pai**, Univ. of Missouri, Columbia; **Hwai-Chung Wu**, Wayne State Univ.

9:10 am: **Structural intensity in dual-mode propagation for damage characterization**, Patrice Masson, Univ. de Sherbrooke (Canada); Roger Halkyard, The Univ. of Auckland (New Zealand) [7295-87]

9:30 am: **An examination of the ARX as a residual generator for damage detection**, Dionisio Bernal, Northeastern Univ. (United States); Daniele Zonta, Matteo Pozzi, Univ. degli Studi di Trento (Italy). [7295-88]

9:50 am: **Locating damage from output-equating loading conditions**, Dionisio Bernal, Northeastern Univ. (United States). [7295-89]

Coffee Break. 10:10 to 10:40 am

SESSION 19

Room: Royal Palm IV
Thurs. 9:10 to 10:10 am

SHM for Civil and Infrastructure Engineering

Session Chairs: **Jerome P. Lynch**, Univ. of Michigan; **Won-Bae Na**, Pukyong National Univ. (Korea, Republic of)

9:10 am: **Receptance-based structural health monitoring approach for bridge structures**, Shin Ae Jang, Billie F. Spencer, Jr., Univ. of Illinois at Urbana-Champaign (United States) [7295-61]

9:30 am: **Output-only modal analysis approach for time unsynchronization signals in wireless sensor network**, Jinho Woo, Juwon Lee, Won-Bae Na, Pukyong National Univ. (Korea, Republic of)[7295-63]

9:50 am: **Monitoring and evaluation of the anomalous vibration of a cable in a stayed bridge**, Roberto C. Alvarado, Univ. Autónoma de Querétaro (Mexico) [7295-66]

Coffee Break. 10:10 to 10:40 am

Conference 7286	Conference 7287	Conference 7288	Conference 7289	
<p>SESSION 5, continued</p> <p>Room: Sunset Thurs. 9:30 to 11:40 am</p> <p>10:40 am: Optimal sensor placement on a composite wing for structural health monitoring, Clyde K. Coelho, Albert Moncada, Whitney D. Reynolds, Aditi Chattopadhyay, John Rajadas, Arizona State Univ. (United States) [7286-21]</p> <p>11:00 am: Extended PCA visualisation of system damage features under environmental and operational variations, Luis Eduardo Mujica-Delgado, José Rodellar, Univ. Politècnica de Catalunya (Spain); Keith Worden, Wieslaw J. Staszewski, The Univ. of Sheffield (United Kingdom) [7286-22]</p> <p>11:20 am: Modeling of self-repairing aircraft based on multi-agent system, Kaiya Yuan, Shou-Song Hu, Nanjing Univ. of Aeronautics and Astronautics (China) [7286-23]</p> <p>Lunch Break 11:40 am to 1:00 pm</p>	<p style="text-align: center;">Sessions 10, 12 and 13 run concurrently</p> <div style="display: flex; justify-content: space-between;"> <div style="width: 48%;"> <p style="text-align: center;">SESSION 10, continued</p> <p style="text-align: center;">Room: Pacific Salon I-III Thurs. 9:10 am to 12:00 pm</p> <p>Application of EAP to Robotics <i>Session Chairs: Lenore Rasmussen, Ras Labs., LLC; John David W. Madden, The Univ. of British Columbia (Canada)</i></p> <p>10:30 am: The development of electrically driven mechanochemical actuators that act as artificial muscle (<i>Invited Paper</i>), Lenore Rasmussen, Carl J. Erickson, Ras Labs., LLC (United States); Lewis D. Meixler, Princeton Univ. (United States) . . . [7287-49]</p> <p>11:00 am: Powerful tubular core free DEAP 'PUSH' actuator, Mike Tryson, Hans-Erik Kill, Mohamed Beslimane, Danfoss A/S (Denmark) [7287-50]</p> <p>11:20 am: Jellyfish underwater unmanned vehicle, Nicholas D. Thayer, Sanghun Chung, Yonas Tadessa, Shashank Priya, Virginia Polytechnic Institute and State Univ. (United States); Jack Costello, Providence College (United States) [7287-51]</p> <p>11:40 am: A dielectric elastomer actuator thin membrane rotary motor, Iain A. Anderson, The Univ. of Auckland (New Zealand); Emilio P. Calius, Industrial Research Ltd. (New Zealand); Todd A. Gisby, Thomas G. McKay, Benjamin M. O'Brien, Scott H. Walbran, The Univ. of Auckland (New Zealand) [7287-52]</p> <p>Lunch Break 12:00 to 1:30 pm</p> </div> <div style="width: 48%;"> <p style="text-align: center;">SESSION 13</p> <p style="text-align: center;">Room: Pacific Salon VI/VII Thurs. 10:30 am to 12:00 pm</p> <p>Applications of EAP to Optical Devices <i>Session Chairs: Hyouk Ryeol Choi, Sungkyunkwan Univ. (Korea, Republic of); Hani E. Naguib, Univ. of Toronto (Canada)</i></p> <p>10:30 am: Advances of shape-memory polymer in actuation (<i>Invited Paper</i>), Jinsong Leng, Harbin Institute of Technology (China) [7287-56]</p> <p>11:00 am: Electrically conductive shape-memory polymer filled with Ni powder chains, Xin Lan, Harbin Institute of Technology (China); Weimin Huang, Nanyang Technological Univ. (Singapore); Yanju Liu, Jinsong Leng, Harbin Institute of Technology (China) [7287-57]</p> <p>11:20 am: Novel thermoplastic elastomeric gels as high-performance actuators with no mechanical pre-strain, Pruthesh H. Vargantwar, Tushar K. Ghosh, Richard J. Spontak, North Carolina State Univ. (United States) [7287-58]</p> <p>11:40 am: A new EAP based on EOF: nastic actuators, Menake E. Piyasena, Benjamin Shapiro, Elisabeth Smela, Univ. of Maryland, College Park (United States) [7287-59]</p> <p>Lunch Break 12:00 to 1:30 pm</p> </div> </div>		<p style="text-align: center;">SESSION 20</p> <p style="text-align: center;">Room: Sunrise Thurs. 10:40 am to 12:00 pm</p> <p style="text-align: center;">Passive and Active Vibration IV <i>Session Chair: Amr M. Baz, Univ. of Maryland, College Park</i></p> <p>10:40 am: Design and analysis of an adaptive vibration isolation system considering large scale parameter variations, Soong-Oh Han, Kai Wolf, Holger Hanselka, Technische Univ. Darmstadt (Germany) [7288-84]</p> <p>11:00 am: Genetic algorithm-based multi-objective optimal absorber system for three-dimensional seismic structures, Wenjie Ren, Hebei Univ. of Technology (China); Hong-Nan Li, Dalian Univ. of Technology (China); Gangbing Song, Univ. of Houston (United States) [7288-85]</p> <p>11:20 am: Exploration of nonlinear shunting strategies as effective vibration absorber, Régis Vigié, Gaëtan Kerschen, Univ. de Liège (Belgium); Massimo Ruzzene, Georgia Institute of Technology (United States) [7288-86]</p> <p>11:40 am: Vibration suppression of satellites using multifunctional platforms, Nicolas Antin, Richard Russ, Kougen Ma, Mehrdad N. Ghasemi-Nejhad, Univ. of Hawai'i (United States) [7288-87]</p> <p>Lunch Break 12:00 to 1:30 pm</p>	<p style="text-align: center;">SESSION 12</p> <p style="text-align: center;">Room: Pacific Salon IV-V Thurs. 10:40 to 11:40 am</p> <p style="text-align: center;">Magneto-Active Materials II: Magnetolectric Coupling <i>Session Chair: LeAnn E. Faidley, Iowa State Univ.</i></p> <p>10:40 am: Phase field simulation of magnetolectric domains of BiFeO₃, Jiangyu Li, Liangjun Li, Univ. of Washington (United States); Yi-Chung Shu, National Taiwan Univ. (Taiwan) [7289-60]</p> <p>11:00 am: Multiferroic nanofibers by sol-gel based electrospinning, Jiangyu Li, Univ. of Washington (United States); Shuhong Xie, Xiantan Univ. (China) [7289-61]</p> <p>11:20 am: Magnetolectric device demonstrating nanoscale magnetic single-domain control, Tien-Kan Chung, Scott Keller, Gregory P. Carman, Univ. of California, Los Angeles (United States) . . . [7289-62]</p> <p>Lunch Break 11:40 am to 1:30 pm</p>

Conference 7292

Sessions 23, 27 and 31 run concurrently

SESSION 23

Room: Royal Palm I
Thurs. 10:40 to 11:40 am

Smart Sensors and SHM

Session Chairs: **Jeong-Tae Kim**, Pukyong National Univ. (Korea, Republic of); **Jialai Wang**, The Univ. of Alabama at Tuscaloosa

10:40 am: **Damage detection algorithm-embedded smart sensor node system for bridge structural health monitoring**, Jae-Hyung Park, Duc-Duy Ho, Jeong-Tae Kim, Yeon-Sun Ryu, Pukyong National Univ. (Korea, Republic of); Chung-Bang Yun, Korea Advanced Institute of Science and Technology (Korea, Republic of) [7292-99]

11:00 am: **Electromechanical coupling analysis of piezoelectric smart beams**, Jialai Wang, Shixin Zeng, The Univ. of Alabama at Tuscaloosa (United States) [7292-101]

11:20 am: **Turning the building into a smart structure: integrating health monitoring**, Chin-Hsiung Loh, Kung-Chun Lu, Shao-Chun Jian, National Taiwan Univ. (Taiwan) [7292-102]

Lunch Break 11:40 to 1:10 pm

SESSION 27

Room: Royal Palm II
Thurs. 10:40 to 11:40 am

SHM for Composite Materials

Session Chairs: **Akira Todoroki**, Tokyo Institute of Technology (Japan); **Zafar Mahmood**, National Univ. of Science and Technology (Pakistan)

10:40 am: **Self-deployable graphite/epoxy composites space structure with embedded SMA wires**, Akira Todoroki, Keisuke Kumagai, Ryosuke Matsuzaki, Tokyo Institute of Technology (Japan) [7292-117]

11:00 am: **Structural health monitoring of glass/epoxy composite plates with MEMS PMN-PT sensors**, Brenton Simon, Hong-Yue Tang, David A. Horsley, Univ. of California, Davis (United States); Wahyu Lestari, Embry-Riddle Aeronautical Univ. (United States); Valeria La Saponara, Univ. of California, Davis (United States) [7292-118]

11:20 am: **Smart discrete sensor array for fault diagnostics of rotating machinery**, Zafar Mahmood, National Univ. of Science and Technology (Pakistan); Nadeem Lehasab, Air Univ. (Pakistan); Nazir S. Khattak, Univ. of Peshawar (Pakistan) . . . [7292-119]

Lunch Break 11:40 to 1:30 pm

SESSION 31

Room: Royal Palm III
Thurs. 10:40 to 11:40 am

SHM and Damage Detection II

Session Chairs: **Chih-Chen Chang**, Hong Kong Univ. of Science and Technology (Hong Kong, China); **Zhishen Wu**, Ibaraki Univ. (Japan)

10:40 am: **Damage detection using frequency response functions**, Ting-Yu Hsu, Chin-Hsiung Loh, National Taiwan Univ. (Taiwan) [7292-132]

11:00 am: **Structural identification of progressive damage states in short concrete columns under seismic excitations**, Zhishen Wu, Phillips A. Adewuyi, Ibaraki Univ. (Japan); Songtao Xue, Kinki Univ. (Japan) [7292-134]

11:20 am: **Wavelet entropy based damage identification using wireless smart sensors**, Gun-Jin Yun, Soon-Gie Lee, Joan E. Carletta, Univ. of Akron (United States); Tomonori Nagayama, Univ. of Illinois at Urbana-Champaign (United States) [7292-135]

Lunch Break 11:40 am to 1:10 pm

Conference 7295

Sessions 17 and 20 run concurrently

SESSION 17

Room: Royal Palm V
Thurs. 10:40 am to 12:00 pm

Emerging and Futuristic Techniques and Issues

Session Chairs: **Olivier Giraud**, ONERA (France); **Wolfgang Grill**, Univ. Leipzig (Germany)

10:40 am: **Energy scavenging from ambient sources based on ferroelectric materials (Keynote Paper)**, Daniel Guyomar, Mickaël Lallart, Institut National des Sciences Appliquées de Lyon (France) [7295-90]

11:20 am: **Acousto-shearographic method for detecting adherence anomalies**, Olivier Giraud, ONERA (France) [7295-92]

11:40 am: **A two-stage neural-network based method for cycle slip correction of GPS measurements**, Ting-Hua Yi, Dalian Univ. of Technology (China) [7295-101]

Lunch Break 12:00 to 1:30 pm

SESSION 20

Room: Royal Palm IV
Thurs. 10:20 to 11:40 am

Design of Smart Structures and Related Issues

Session Chairs: **Andrei N. Zagrai**, New Mexico Institute of Mining and Technology; **Perngjin F. Pai**, Univ. of Missouri, Columbia

10:20 am: **Operational load estimation of a smart wind turbine rotor blade**, Jonathan White, Douglas E. Adams, Purdue Univ. (United States); Mark A. Rumsey, Sandia National Labs. (United States) [7295-41]

10:40 am: **Intelligent tires for improved tire safety based on strain measurements**, Ryosuke Matsuzaki, Akira Todoroki, Tokyo Institute of Technology (Japan) [7295-42]

11:00 am: **Microsecond structural health monitoring in impact loaded structures**, Jacob C. Dodson, Daniel J. Inman, Virginia Polytechnic Institute and State Univ. (United States); Jason R. Foley, Air Force Research Lab. (United States) [7295-43]

11:20 am: **Structural damage identification using feedback control with principal component analysis**, Jiann-Shiun Lew, Tennessee State Univ. (United States) [7295-44]

Lunch Break 11:40 am to 1:10 pm

Conference 7286	Conference 7287	Conference 7288	Conference 7289
<p style="text-align: center;">SESSION 6</p> <p style="text-align: center;">Room: Sunset Thurs. 1:00 to 3:20 pm</p> <p style="text-align: center;">Dynamic Modeling of Smart Structures</p> <p><i>Session Chair: William S. Galinaitis, Rose-Hulman Institute of Technology</i></p> <p>1:00 pm: Discrete ray modeling for ultrasonic liquid flow controllers, Fuzhang Zhao, Thomas O. Maginnis, Celerity, Inc. (United States) . . . [7286-24]</p> <p>1:20 pm: A multi-axial ferroelastic switching model using a homogenized energy approach, William S. Oates, Florida State Univ. (United States) . [7286-26]</p> <p>1:40 pm: Efficient dynamical modeling of tensegrity systems (Invited Paper), Robert E. Skelton, Univ. of California, San Diego (United States) [7286-27]</p> <p>2:00 pm: Localization and the invariant probability measure for a structural dynamic system, Glen J. Kissel, Univ. of Southern Indiana (United States) [7286-28]</p> <p>2:20 pm: Modeling of deflection and ion migration behavior in Electro-Active Paper actuator, Sangdong Jang, Joo-Hyung Kim, Jaehwan Kim, Inha Univ. (Korea, Republic of) [7286-29]</p> <p>2:40 pm: Phenomenological modeling of shape memory alloys for martensite reorientation at large deformation, Jamal Arghavani, Sharif Univ. of Technology (Iran, Islamic Republic of); Reza Naghdabadi, Sharif Univ. of Technology (Iran, Islamic Republic of) and Institute for Nano Science and Technology, Sharif Univ. of Technology (Iran, Islamic Republic of) [7286-30]</p> <p>3:00 pm: Parameters analysis for assistant cables of system for transient main cables and catwalk of Long-Span Suspension Bridge at construction stages, Shengli Li, Harbin Institute of Technology (China) [7286-31]</p> <p>• Conference 7296 End.</p>	<p style="text-align: center;">SESSION 11</p> <p style="text-align: center;">Room: Pacific Salon I-III Thurs. 1:30 to 3:30 pm</p> <p style="text-align: center;">Applications of EAP</p> <p><i>Session Chairs: Jaehwan Kim, Inha Univ. (Korea, Republic of); Jonathan M. Rossiter, Univ. of Bristol (United Kingdom)</i></p> <p>1:30 pm: Electrically-activated catheter using polypyrrole actuators: cycling effects, John D. W. Madden, Tina Shoa, Tissaphern Mirfakhrai, Niuloofar Fekri, The Univ. of British Columbia (Canada) [7287-60]</p> <p>1:50 pm: Conducting polymer actuator driven catheter: overview and applications, John D. W. Madden, Tina Shoa, The Univ. of British Columbia (Canada); Nigel R. Munce, Univ. of Toronto (Canada); Victor X. D. Yang, Sunnybrook Hospital (Canada) [7287-61]</p> <p>2:10 pm: Application of EAP materials toward a refreshable braille display, Neil H. Di Spigna, Partha Chakraborti, Peichun Yang, Tushar K. Ghosh, Paul D. Franzon, North Carolina State Univ. (United States) [7287-62]</p> <p>2:30 pm: Utilization of electroactive polymers in responsive drug delivery systems, Lawrence Kulinsky, Han-Kuan A. Tsai, Univ. of California, Irvine (United States); Elizabeth A. Moschou, Sylvia Daunert, Univ. of Kentucky (United States); Marc J. Madou, Univ. of California, Irvine (United States) [7287-63]</p> <p>2:50 pm: Modeling of robotic fish propelled by an ionic polymer-metal composite caudal fin, Zheng Chen, Stephan Shataru, Xiaobo Tan, Michigan State Univ. (United States) [7287-64]</p> <p>3:10 pm: Positioning control of nafion-Au ionic polymer metal composite: mechanism of IPMC's residual deformation for positioning control, Akitoshi Itoh, Toshihiro Tanaka, Yoshiaki Mori, Tokyo Denki Univ. (Japan) [7287-65]</p> <p>• Conference 7287 End.</p>	<p style="text-align: center;">SESSION 21</p> <p style="text-align: center;">Room: Sunrise Thurs. 1:30 to 2:30 pm</p> <p style="text-align: center;">Passive and Active Vibration V</p> <p><i>Session Chairs: Mehrdad N. Ghasemi-Nejhad, Univ. of Hawaii'i at Manoa; Eric H. Anderson, CSA Engineering, Inc.</i></p> <p>1:30 pm: Precision tracking control using dual-stage actuation system, Wei Dong, Jiong Tang, Univ. of Connecticut (United States) [7288-89]</p> <p>1:50 pm: Nonlinear decentralized control of seismically excited civil structures, Jian Wang, Harbin Institute of Technology (China) . . . [7288-91]</p> <p>2:10 pm: Study of shear-mode piezoelectric patch/complete layer in smart laminated shell panels, AliReza Daneshmehr, M. B. Chapardar, Islamic Azad Univ. (Iran, Islamic Republic of) [7288-102]</p> <p>• Conference 7288 End.</p>	<p style="text-align: center;">SESSION 13</p> <p style="text-align: center;">Room: Pacific Salon IV-V Thurs. 1:30 to 2:50 pm</p> <p style="text-align: center;">Magneto-Active Materials III</p> <p>1:30 pm: Lumped parameter modeling of the actuator behavior of ferrogels, LeAnn E. Faidley, Eric T. Harrington, Elease J. McLaurin, Iowa State Univ. (United States) [7289-63]</p> <p>1:50 pm: Magnetorheological solid composites based on ionic liquids, Carlos Guerrero Sanchez, Technische Univ. Eindhoven (Netherlands); Ulrich S. Schubert, Friedrich-Schiller-Univ. Jena (Germany) [7289-64]</p> <p>2:10 pm: Effect of magnetic field on the bending response of magnetostrictive/piezoelectric laminated actuators, Fumio Narita, Yasuhide Shindo, Kotaro Mori, Tohoku Univ. (Japan) [7289-65]</p> <p>2:30 pm: Predicting magnetorheological fluid flow behavior using a multiscale kinetic theory-based model, Monon Mahboob, The Ohio State Univ. (United States); Farzad Ahmadvanlou, U.S. Hybrid (United States); Christopher Kagarise, Gregory N. Washington, Stephen E. Bechtel, Kurt Koelling, The Ohio State Univ. (United States) [7289-66]</p> <p>Coffee Break 2:50 to 3:20 pm</p> <p style="text-align: center;">SESSION 14</p> <p style="text-align: center;">Room: Pacific Salon IV-V Thurs. 3:20 to 4:40 pm</p> <p style="text-align: center;">Magneto-Active Materials IV: Magnetostriction</p> <p>3:20 pm: Measurement and modeling of magnetomechanical coupling in magnetostrictive iron-gallium alloys, Phillip G. Evans, Marcelo J. Dapino, The Ohio State Univ. (United States) [7289-67]</p> <p>3:40 pm: Mechanical behavior and auxetic properties of Galfenol, Holly M. Schurter, Alison B. Flatau, Univ. of Maryland, College Park (United States); Y. N. Zhang, Ruqian Q. Wu, Univ. of California, Irvine (United States) [7289-68]</p> <p>4:00 pm: The mechanical behaviour of Galfenol steel and ternary Galfenol alloys, Allison E. Nolting, Leon M. Cheng, Defence Research and Development Canada (Canada) [7289-69]</p> <p>4:20 pm: Effects of particle size on magnetostrictive properties of magnetostrictive composites with low particulate volume fraction, Xufeng Dong, Xinchun Guan, Jinping Ou, Harbin Institute of Technology (China) [7289-70]</p> <p>• Conference 7289 End.</p>

Conference 7292

Sessions 24, 28 and 32 run concurrently

SESSION 24

Room: Royal Palm I
Thurs. 1:10 to 2:50 pm

Signal Processing I

Session Chairs: **Zhi Sun**, Tongji Univ. (China); **Hongwei Huang**, Tongji Univ. (China)

1:10 pm: **Three-dimensional translation and rotation vibration measurement using monocular vision**, Xinghua Xiao, Hong Kong Univ. of Science and Technology (Hong Kong, China) [7292-103]

1:30 pm: **Robust identification of human activities in buildings using multiple sensor system**, Masayoshi Ashihara, Akira Mita, Keio Univ. (Japan) [7292-104]

1:50 pm: **Principle component analysis-based system identification from digital camera-measured displacement responses of frame structure**, Zhi Sun, Ning Hou, Tongji Univ. (China) [7292-105]

2:10 pm: **Definition and application of life index for the needs of structural life-cycle design**, Lin Chi, Harbin Institute of Technology (China); Jinping Ou, Dalian Univ. of Technology (China) and Harbin Institute of Technology (China) [7292-106]

2:20 pm: **Experimental verification of the extended Kalman filter with unknown input for damage identification of structures**, Hongwei Huang, Tongji Univ. (China); Jann N. Yang, Univ. of California, Irvine (United States); Li Zhou, Nanjing Univ. of Aeronautics and Astronautics (China) [7292-107]

Coffee Break 2:50 to 3:20 pm

SESSION 28

Room: Royal Palm II
Thurs. 1:30 to 2:50 pm

Fiber Optic Sensors for SHM I

Session Chairs: **Vladimir Kochergin**, Luna Innovations Inc.; **Oluwaseyi Balogun**, Northwestern Univ.

1:30 pm: **All-fiber-optic ultrasonic structural health monitoring system**, Vladimir Kochergin, Zhong Shi, Michael K. Pedrick, Kevin Flanagan, Luna Innovations Inc. (United States) [7292-120]

1:50 pm: **Reliability analysis of fiber optic sensors for structural health monitoring applications**, Yasir Majeed, Univ. of Maryland, College Park (United States) [7292-122]

2:10 pm: **Embedding fiber Bragg gratings for fabrication of smart tools using laser-based layered manufacturing**, Hamidreza Alemohammad, Ehsan Toyserkani, Univ. of Waterloo (Canada) [7292-123]

2:30 pm: **Measurement of compressive and tensile strain in the railway structures with FBG sensor packages**, K. Kim, Hongik Univ. (Korea, Republic of); Y. Kim, Daewoo Engineering & Construction Co. (Korea, Republic of); H. Kwon, Hongik Univ. (Korea, Republic of) [7292-124]

Coffee Break 2:50 to 3:20 pm

SESSION 32

Room: Royal Palm III
Thurs. 1:10 to 2:50 pm

Optical Sensors and Applications

Session Chairs: **Hui Liu**, Nanyang Technological Univ. (Singapore); **Liang Ren**, Dalian Univ. of Technology (China)

1:10 pm: **Experimental study on sensing capability of fibre optic and piezoceramic sensors for application in engineering structures**, Yaowen Yang, Hui Liu, Nanyang Technological Univ. (Singapore); Venu G. M. Annamdas, Univ. of Pittsburgh (United States) [7292-136]

1:30 pm: **Experimental testing of a self-sensing FRP-concrete composite beam using FBG Sensors**, Yanlei Wang, Dalian Univ. of Technology (China); Qingduo Hao, Harbin Institute of Technology (China); Jinping Ou, Dalian Univ. of Technology (China) and Harbin Institute of Technology (China) [7292-137]

1:50 pm: **Seismic damage monitoring for steel structure using smart distributed fiber optics**, Shuang Hou, Dalian Univ. of Technology (China); C. S. S. Cai, Jian He, Guoping Zhang, Louisiana State Univ. (United States); Jinping Ou, Dalian Univ. of Technology (China) [7292-138]

2:10 pm: **Cracking monitoring by FBG strain sensor in the small scale dam model**, Liang Ren, Dalian Univ. of Technology (China) [7292-139]

2:30 pm: **Research on BOTDR sensing technique in health monitoring of bridge structures**, Xuefeng Zhao, JinPing Ou, Dalian Univ. of Technology (China) [7292-140]

Coffee Break 2:50 to 3:20 pm

Conference 7295

Sessions 18 and 21 run concurrently

SESSION 18

Room: Royal Palm V
Thurs. 1:30 to 2:50 pm

Modeling and Simulation for SHM II

Session Chairs: **George Zentai**, Varian Medical Systems, Inc.; **Shivan Haran**, Arkansas State Univ.

1:30 pm: **Periodic cellular piezoelectric sensors and actuators**, Massimo Ruzzene, Georgia Institute of Technology (United States) [7295-93]

1:50 pm: **Determining the elastic modulus of thin polymer films by modelling in phase sensitive acoustic microscopy**, Albert E. Kamanyi, Jr., Wolfgang Grill, Univ. Leipzig (Germany) [7295-94]

2:10 pm: **Residual based damage detection in output-only systems: an examination of the AR-ARX and the AR-OL alternatives**, Dionisio Bernal, Bethany Carlson, Northeastern Univ. (United States) [7295-95]

2:30 pm: **Light propagation through biological tissue: comparison of Monte Carlo simulation with deterministic models**, Ashwani Kumar, Sant Longowal Institute of Engineering and Technology (India) [7295-96]

Coffee Break 2:50 to 3:20 pm

SESSION 21

Room: Royal Palm IV
Thurs. 1:10 to 2:50 pm

SHM of Composite Materials

Session Chairs: **Sridhar Krishnaswamy**, Northwestern Univ.; **Andrei N. Zagrai**, New Mexico Institute of Mining and Technology

1:10 pm: **Ultrasonic camera automatic image depth and stitching modifications for monitoring aerospace composites**, Brad Regez, Goutham R. Kirikera, Martin T. Yuen, Sridhar Krishnaswamy, Northwestern Univ. (United States); Robert Lasser, Imperium, Inc. (United States) [7295-50]

1:30 pm: **Damage detection in sandwich composite materials using laser vibrometry in conjunction with nonlinear system identification**, Sara S. Underwood, Douglas E. Adams, David J. Koester, Purdue Univ. (United States) [7295-51]

1:50 pm: **On the delamination detection in composite beams with active piezoelectric sensors using non-linear ultrasonics**, Dimitris A. Saravanos, Nikos A. Chrysochoidis, Univ. of Patras (Greece) [7295-52]

2:10 pm: **Structural health monitoring and PVDF sensor**, Bohua Sun, Cape Peninsula Univ. of Technology (South Africa) [7295-53]

2:30 pm: **Continuous health monitoring of CFRP plates by smart material actuation and sensing**, Andreas Dantele, Thomas Rittenschöber, Profactor Produktionsforschungs GmbH (Austria) [7295-54]

Coffee Break 2:50 to 3:20 pm

Conference 7292

Sessions 25, 29 and 33 run concurrently

SESSION 25

Room: Royal Palm I
Thurs. 3:20 to 5:20 pm

Signal Processing II

Session Chairs: **Akira Mita**, Keio Univ. (Japan); **Hoon Sohn**, Korea Advanced Institute of Science and Technology (Korea, Republic of)

3:20 pm: **Damage detection based on acceleration data using artificial immune system**, Sandra Chartier, Akira Mita, Keio Univ. (Japan) [7292-108]

3:40 pm: **Damage alarming method of acoustic emission signal of pseudo-static experiment based on fractal theory**, Hui Li, Yong Huang, Xin Yan, Jinping Ou, Harbin Institute of Technology (China) [7292-109]

4:00 pm: **Vibration-based structural health monitoring technique using statistical features for data stability assessment and damage localization**, Zhishen Wu, Adekunle P. Adewuyi, Ibaraki Univ. (Japan) [7292-110]

4:20 pm: **PCA-based leakage detection method for water supply systems considering complex Fourier components**, Chikako Kondo, Akira Mita, Keio Univ. (Japan) [7292-111]

4:40 pm: **Recursive stochastic sub-space identification for structural parameter estimation**, Zhen Li, Chih-chen Chang, Hong Kong Univ. of Science and Technology (Hong Kong, China) [7292-112]

5:00 pm: **Monitoring data-based traffic load effect model statistical analysis for arch bridge suspender**, Gao Xin, Harbin Institute of Technology (China); Jinping Ou, Dalian Univ. of Technology (China) and Harbin Institute of Technology (China) [7292-113]

SESSION 29

Room: Royal Palm II
Thurs. 3:20 to 5:00 pm

Fiber Optic Sensors for SHM II

Session Chairs: **Claire E. Davis**, Defence Science and Technology Organisation (Australia); **Edgar A. Mendoza**, Redondo Optics, Inc.

3:20 pm: **Development of reflection-type optical fiber sensor using one grating panel**, Yeon-Gwan Lee, Sang-Oh Park, Byeong-Wook Jang, Chun-Gon Kim, Korea Advanced Institute of Science and Technology (Korea, Republic of); Dae-Hyun Kim, Seoul National Univ. of Technology (Korea, Republic of) [7292-125]

3:40 pm: **Temperature-independent, Bragg grating based sensor for monitoring regions of localised strain concentration**, Claire E. Davis, William G. A. Brown, Defence Science and Technology Organisation (Australia); Paul R. Stoddart, Swinburne Univ. of Technology (Australia) [7292-126]

4:00 pm: **Demonstration of a fully integrated miniature fiber Bragg grating sensor interrogator**, Edgar A. Mendoza, Redondo Optics, Inc. (United States) [7292-127]

4:20 pm: **Asymptotically accurate nonlinear analysis of electro-elastomer membrane structures**, Ramesh Gupta Burela, Dineshkumar K. Harursampath, Indian Institute of Science (India) [7292-128]

4:40 pm: **Autonomic structural materials with controlled toughening**, Michael Garcia, Henry A. Sodano, Arizona State Univ. (United States) [7292-171]

SESSION 33

Room: Royal Palm III
Thurs. 3:20 to 5:40 pm

Damping and Response Modification

Session Chairs: **Hyung-Jo Jung**, Korea Advanced Institute of Science and Technology (Korea, Republic of); **Satish Nagarajaiah**, Rice Univ.

3:20 pm: **MR damper-based semiactive control system using electromagnetic induction device**, Hyung-Jo Jung, Dong-Doo Jang, Korea Advanced Institute of Science and Technology (Korea, Republic of); Jeong-Hoi Koo, Miami Univ. (United States) [7292-141]

3:40 pm: **Real-time hybrid test of semiactive control by using MR damper with structural model for shaking table test**, Rui Kawasaki, Hideo Fujitani, Kobe Univ. (Japan) [7292-142]

4:00 pm: **Investigation on dynamic coupling between stay cable and magneto-rheological fluid(MR) damper**, Min Liu, Harbin Institute of Technology (China) [7292-143]

4:20 pm: **Self-powered and -sensing control system based on MR damper: presentation and application**, Zhihao Wang, Hunan Univ. (China) and Univ. of Illinois at Urbana-Champaign (United States); Zhengqing Chen, Hunan Univ. (China); Bill F. Spencer, Jr., Univ. of Illinois at Urbana-Champaign (United States) [7292-144]

4:40 pm: **A temperature- and strain-rate-dependent model of NiTi shape memory alloys for seismic control of bridges**, Osman E. Ozbulut, Stefan Hurlbaus, Texas A&M Univ. (United States) [7292-145]

5:00 pm: **Control of hysteretic systems using LPV gain-scheduled controller**, Satish Nagarajaiah, Dharma Theja P. Reddy, Rice Univ. (United States); Karolos M. Grigoriadis, Univ. of Houston (United States) [7292-146]

5:20 pm: **Wind vibration control of high-rise buildings using fuzzy controller optimized by genetic algorithm**, Wei Zheng, Dalian Univ. of Technology (China) and Shenyang Jianzhu Univ. (China); Shi Yan, Shenyang Jianzhu Univ. (China) [7292-147]

• Conference 7292 End.

Conference 7295

SESSION 22

Room: Royal Palm IV
Thurs. 3:20 to 4:20 pm

SHM of Bridge Structures

Session Chairs: **Jerome P. Lynch**, Univ. of Michigan; **Hwai-Chung Wu**, Wayne State Univ.

3:20 pm: **Health monitoring data analysis and comparison of prototype and laboratorial model for long-span cable-stayed bridge**, Ou Yang, Harbin Institute of Technology (China) [7295-67]

3:40 pm: **Separating temperature effect from state monitoring of concrete bridges**, Zongbao Liang, Chongqing Jiaotong Univ. (China) [7295-68]

4:00 pm: **Damage identification method based on structural dynamic characteristics and stress measurements**, Jun Teng, Wei Lu, Harbin Institute of Technology (China) [7295-111]

• Conference 7295 End.

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General Information



Town and Country Resort & Convention Center
500 Hotel Circle North, San Diego, CA

Registration

Onsite Registration Hours

Town and Country Resort & Convention Center

Golden Foyer

Sunday 8 March 7:30 am to 4:00 pm
Monday 9 March 7:00 am to 5:15 pm
Tuesday 10 March 7:00 am to 4:00 pm, 5:30 to 7:00 pm
Wednesday 11 March 7:30 am to 4:00 pm
Thursday 12 March 7:30 am to 11:00 am

Exhibit Hours

Golden Ballroom

Tuesday 10 March 10:00 am to 4:00 pm
Poster reception 6:00 pm to 7:30 pm
Wednesday 11 March 10:00 am to 4:00 pm

Admission to the Exhibition

Admission is included in your conference, or course fees. Or register to attend only the exhibition. Use the exhibit visitor registration form to register to attend the Smart Structures/NDE 2009 Exhibition. Exhibit visitor registration is complimentary.

SPIE Membership

SPIE Members receive discounts on conference and course registration fees.

Add Digital Library subscriptions

Choose an SPIE Digital Library subscription with your registration. Also available: Proceedings of SPIE and Proceedings on CD-ROM. Please see details on the registration form.

Proceedings and CD-ROMs as part of a registration include tax and shipping. Proceedings and CD-ROMs purchased separately do not include shipping or taxes. Please see details on the registration form.

Press Representatives

Media/Press—For credentialed press and media representatives, please email contact information, title, and organization to media@spie.org

Internet Services

Internet Pavilion

Golden Foyer

Sunday through Wednesday 7:00 am to 6:00 pm
Thursday 7:00 am to 1:30 pm

SPIE will have a complimentary Internet Pavilion where attendees can use provided workstations or hook up their laptop to an Ethernet connection to access the Internet. There will be a 10-minute time limit for each person's Internet session.

Complimentary Wireless Internet Access (Wi-Fi)

Guest rooms at the Town and Country Resort & Convention Center are equipped with complimentary high speed wireless Internet, for attendees at Smart Structures/NDE. Laptops will need an appropriate wireless card and access is available in all guest room areas. Please contact Internet call center at Ext. 1234 in order to get this complimentary rate. Note: Wi-Fi service is not available in or near the meeting rooms.

Properly secure your computer before accessing the public wireless network. Failure to do so may allow unauthorized access to your laptop as well as potentially introduce viruses to your computer and/or presentation.

SPIE Onsite Services

SPIE Receipts, Badge Corrections, Cashier

Receipts - Preregistered attendees who did not receive a receipt prior to the meeting may obtain a new copy of their registration receipt onsite at the SPIE Registration Desk.

Badge Corrections - Attendees who need a correction to their badge information onsite may do so at the SPIE Registration Desk. Please have your badge removed from the badge holder, marked with your changes, and ready to hand to the attendant upon approaching the counter.

Cashier Station - If you are paying by cash or check as part of your onsite registration, wish to add a course, or special event requiring payment, or have questions regarding your registration please see the onsite cashier at the Cashier station in the registration area.

Speaker Check-In Desk / Preview Station

Golden Foyer

Sunday-Thursday 7:30 am to 5:00 pm

All conference rooms will have a computer workstation, LCD projector, screen, lapel microphone, and laser pointer. All Presenters are requested to come to the Speaker Check-In Desk to confirm display settings of their presentations from their memory devices or laptops with the audiovisual equipment being used at this symposium.

Course Materials Desk

Golden Foyer

If you have registered to attend a course, please stop by to pick up your badge and course materials.

SPIE Marketplace & Membership Services

Golden Foyer

The SPIE Marketplace is your source for the latest SPIE Press books and Proceedings.

Food and Beverage Services

Coffee Breaks

Lion Fountain Court

Sunday, Monday and Thursday

Golden Ballroom

Tuesday and Wednesday

Complimentary coffee will be served twice each day of the conference at approximately 10:00 am and 3:00 pm. Please check the individual technical conference listings for exact times.

Coffee Cart

Golden Ballroom

Monday-Thursday 7:00 am to 2:00 pm

Coffee, espresso, pastries and sodas all available for purchase.

Desserts

Golden Ballroom

Tuesday and Wednesday 3:00 to 3:30 pm

Dessert snacks will be served in the Exhibition Hall, from 3:00 to 3:30 pm. Complimentary tickets for the dessert snacks will be included in attendee registration packets.

Business Services

Business Center

Grand Foyer

Monday through Thursday

The business center can make copies, print documents or transparencies from your laptop, fax services and office supplies. Prices for services are posted onsite.

Message Center

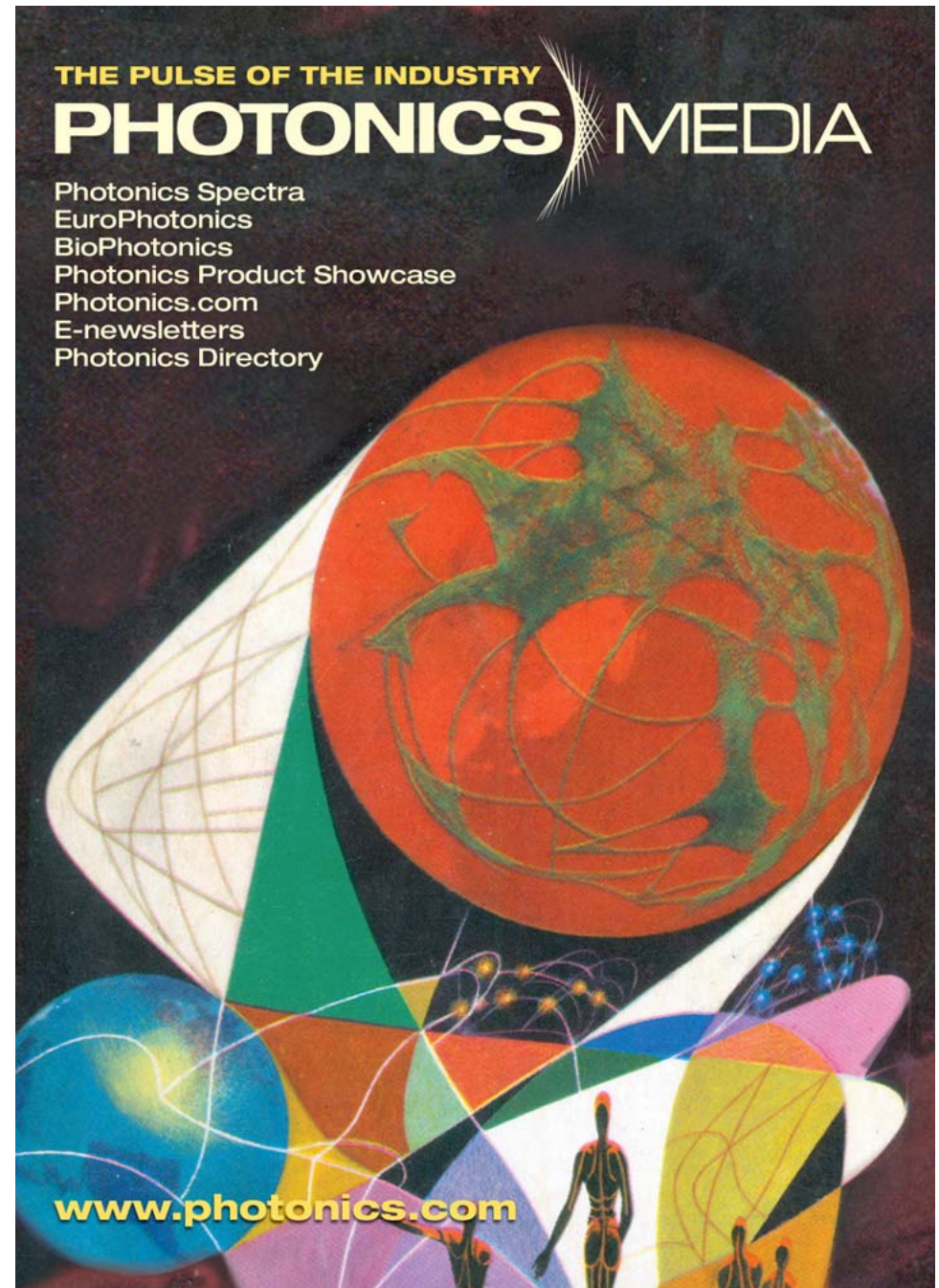
Town and Country Resort phone number: (619) 291-7131

The SPIE Message Board will be located near the Registration Desk. Messages will be taken during registration hours Sunday through Thursday. To leave a message, call the hotel and ask the hotel operator for the SPIE Registration Desk.

Child Care

Marion's Childcare, email amy@hotelchildcare.com, within San Diego call (619) 303-4379, or 1-888-891-5029, www.hotelchildcare.com

SPIE does not imply an endorsement or recommendation of this service. It is provided on an "information only" basis for your further analysis and decision. Other services may be available.



General Information

Policies

Audio, Video, Digital Recording Policy

In the Meeting Rooms and Poster Sessions: For copyright reasons, recordings of any kind are strictly prohibited without prior written consent of the presenter in any conference session, short course or of posters presented. Each presenter being taped must file a signed written consent form. Individuals not complying with this policy will be asked to leave a given session and asked to surrender their film or recording media. Consent forms are available at the SPIE Speaker Check-In Desk.

In the Exhibition Hall: For security and courtesy reasons, photographing or videotaping individual booths and displays in the exhibit hall is allowed ONLY with explicit permission from on-site company representatives. Individuals not complying with this policy will be asked to surrender their film and to leave the exhibit hall.

Laser Pointer Safety Information

SPIE supplies tested and safety approved laser pointers for all conference meeting rooms, and for short course rooms if instructors request one. For safety reasons, SPIE requests that presenters use our provided laser pointers available in each meeting room.

If using your own laser pointer, have it tested at your facility to make sure it has <5 mW power output. Laser pointers in Class II and IIIa (<5 mW) are eye safe if power output is correct - but don't automatically trust the labeling. Commercially available laser pointers, red or green (or any color), could be incorrectly labeled as to their wavelength and power output.

Presenters intending to use their own laser pointer for presentations are required to come to the Speaker Check In Desk onsite and test their pointer on our power meter. If the pointer fails the safe power level you may not use the pointer at the conference. You will be required to sign a waiver releasing SPIE of any liability for use of potentially non-safe laser pointers.

Use of a personal laser pointer at an SPIE event represents user's acceptance of liability for use of a non-SPIE supplied laser pointer device. Misuse of any laser pointer could lead to eye damage. In California, it is a criminal misdemeanor to shine a laser pointer at individuals "who perceive they are at risk."

Underage Persons on Exhibition Floor

For safety and insurance reasons, no persons under the age of 16 will be allowed in the exhibition area during move-in and move-out. During open exhibition hours, only children over the age of 12 accompanied by an adult will be allowed in the exhibition area.

Unauthorized Solicitation

Any manufacturer or supplier who is not an exhibitor and is observed to be soliciting business in the aisles, or in another company's booth, will be asked to leave immediately. Unauthorized solicitation in the Exhibition Hall is prohibited.

Unsecured Items

Personal belongings such as briefcases, backpacks, coats, book bags, etc. should not be left unattended in meeting rooms or public areas. These items will be subject to removal by security upon discovery.

Local Attractions

Attendees wishing to arrange for tours/sightseeing for themselves, or traveling guests, may contact the hotel concierge prior to the meeting to make arrangements: concierge@towncountry.com. Concierge services are offered onsite in the main lobby. The hotel will also provide a special Concierge Services desk near SPIE registration for the convenience of SPIE attendees, Sunday-Wednesday from 8:30 am to 10 am.

Services include:

- Discount tickets to San Diego Zoo and SeaWorld
- Discount rates for Riverwalk Golf Course
- Priority seating at Hotel Restaurants and off property restaurants
- San Diego City, Mexico, wine tours or harbor excursions
- Public Transit Information, local driving directions/maps

Fashion Valley Mall

Located directly behind the hotel. Two-level outdoor garden center featuring over 300 specialty shops and restaurants and an 18-screen movie complex. It is the largest shopping area in San Diego!

Old Town

Take the Trolley or Hotel Shuttle to the founding site of San Diego with excellent Mexican dining and shopping.

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Take the Trolley to downtown San Diego and enjoy shopping at Horton Plaza and/or the exciting nightlife of excellent restaurants and clubs of the Gas Lamp District.

Seaport Village

Situated on 22 acres of parkland at the water's edge, over 60 shops, galleries, and boutiques along with restaurants are found in this unique village.

Travel

About San Diego

Welcome to San Diego, California's second largest city and the United States' seventh largest. Where blue skies keep watch on 70 miles of beaches and a gentle Mediterranean climate begs for a day of everything and nothing. Bordered by Mexico, the Pacific Ocean, the Anza-Borrego Desert and the Laguna Mountains, San Diego County's 4,200 square miles offer immense options for business and pleasure.

For more information about San Diego, sightseeing, shopping and restaurants, visit their web site at: www.sandiego.org

Driving to the Meeting

The hotel is located at 500 Hotel Circle North in the Mission Valley area of San Diego, California.

To reach the hotel from north or south, take I-5 to I-8 east. Follow I-8 east to the "Hotel Circle" exit. The Town and Country is located at Hotel Circle North and Fashion Valley Road. From I-805, take I-8 west to the Hotel Circle exit and proceed to Hotel Circle North.

Parking

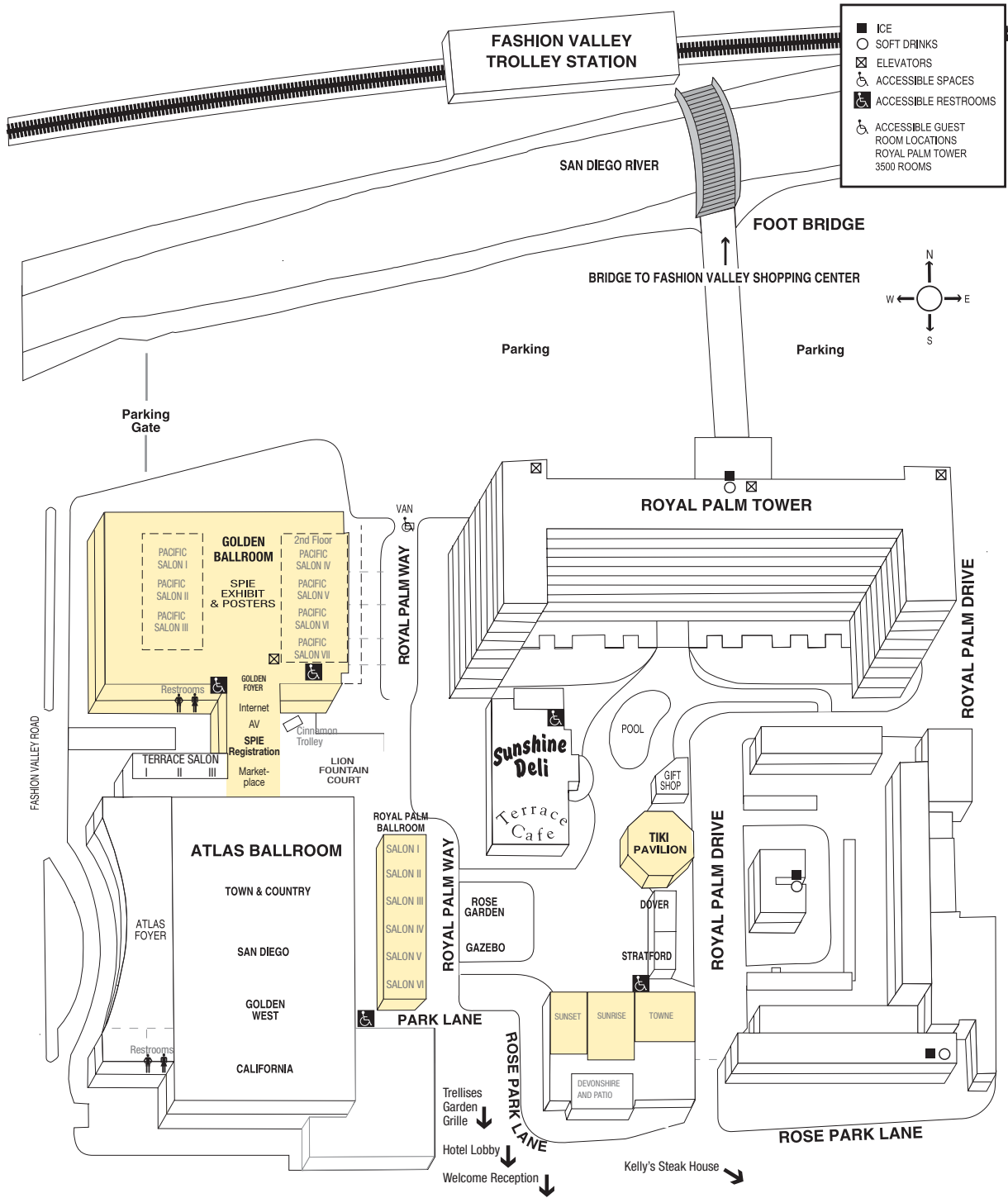
Discounted parking for hotel guests is \$5.00 per day. Local guests pay \$3.00 for the first hour, \$2.00 each additional hour, not to exceed \$8 per day.

Car Rental

Hertz Car Rental has been selected as the official car rental agency for this Symposium. To reserve a car, identify yourself as a Smart Structures Conference attendee using the Hertz Meeting Code CV# 029B0011. Call 1-800-654-2240.

Xpress Shuttle

Xpress Shuttle has offered SPIE Smart Structures and Materials/NDE attendees a discounted rate of \$9.00 each way from the San Diego Airport to the Town and Country Resort & Convention Center. Be sure to refer to SPIE Smart Structures and Materials/NDE to receive this rate. Call Xpress Shuttle by dialing #50 on the courtesy phone marked "Transportation" in the baggage claim area and the receptionist will direct you to the "Shuttles for Hire" Island. The shuttle will pick you up within 10 minutes. Watch for the yellow & blue van. Cash or credit cards accepted by driver, but checks are not. You may also book in advance by calling Xpress Shuttle at 1-800-900-7433. The discount rate is not available with online booking.



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Cloud 9 Shuttle runs 24 hours per day, seven days a week. At the airport, look for assistants dressed in blue shirts and khaki pants by the “Shuttles for Hire” Island. The assistants will call the shuttle for you. Otherwise you may call on the courtesy phone inside the baggage claim area to arrange for pickup. Cash and credit cards accepted - no checks. To cancel a reservation, you must call Cloud 9 to notify them to avoid a penalty fee. To book your return to the airport, call for reservations at least 24 hours in advance. Cloud 9 Shuttle recommends a pickup time of at least 2 hours prior to flight departure time. Shuttle stops enroute to load/unload passengers. For additional information call 1-800-974-8885 or 1-858-974-8885, or www.cloud9shuttle.com. The one-way fare from the San Diego Airport to The Town and Country Resort & Convention Center is \$11.50 (subject to change).

Taxi Service

Taxi service from the San Diego Airport to the Town and Country Resort & Convention Center is \$23 depending on traffic.

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(Metropolitan Transit System)

The San Diego Trolley, i.e. the light rail, is referred to as the “moving landmark” and is a fun way to get around, serving a wide area from the International Border, to Centre City’s shopping harbor, Mission Valley, Fashion Valley, Old Town, Downtown including the Gas Lamp Quarter, etc. Fares are based on the trip distance. The fare ranges from \$1.25 to \$3.00 depending on how many stations are traveled (fares are subject to change). Trolley cars are red, and they travel above ground on light rail lines. The closest trolley stop, the Fashion Valley Transit Center is located between the Hotel and the Fashion Valley Mall, handy to Old Town, Downtown and even Tijuana. Check the website www.sdcommute.com or call 619-233-3004 for schedule information.



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