SPIE

Smart Structures/NDE

Smart Structures and Materials & Nondestructive Evaluation and Health Monitoring

15th Annual International Symposium

Conferences + Courses: 9–13 March 2008
Exhibition: 11–12 March 2008

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

Technical Program



SPIE
Connecting minds. Advancing light.

Welcome

The Organizing Committee of SPIE's 15th Annual International Symposium on Smart Structures and Materials & Nondestructive Evaluation and Health Monitoring invites you to attend 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 decade, this meeting has grown from small beginnings in the thenemerging 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, for which the armwrestling contest 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 develop new concepts for addressing the 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 look forward to seeing you in San Diego!

2008 Symposium Organizers

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.

Technical Program

SPIE Smart Structures/NDE

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Sponsored by

SPIE

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American Society of Mechanical Engineers

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Intelligent Materials Forum (Japan)
Jet Propulsion Lab.
National Science Foundation

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Don't miss the exhibition!

Left Cover image: Courtesy NASA JPL

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Sunday 9 March

Technology and Applications Overviews

Golden West Room

Sunday 9 March . . . . . 1:00 to 4:00 pm

These technology and applications overviews are intended to give the 'big picture' of issues and opportunities of the enabling technologies such as materials, devices for sensors and actuators, control systems, power supplies, signal processing and systems integration that drive applications. The applications areas reflect the current trend of opportunities. The overview presentations will be given by the conference chairs of the various SSM and NDE chairs, and should be of interest to all symposium attendees.

1:00 to 1:10 pm: **Opening Remarks**

Overview Chairs: **Donald J. Leo,** Virginia Polytechnic Institute and State Univ. and **Kara J. Peters,** North Carolina State Univ.

1:10 to 1:25 pm: **Conference 6926: Modeling, Signal Processing, and Control**

Douglas K. Lindner, Virginia Polytechnic Institute and State Univ.

1:25 to1:40 pm: **Conference 6927: Electroactive Polymer Actuators and Devices (EAPAD)**

Yoseph Bar-Cohen, Jet Propulsion Lab.

1:40 to1:55 pm: **Conference 6928: Active and Passive Smart Structures and Integrated Systems**

Mehdi Ahmadian, Virginia Polytechnic Institute and State Univ.

1:55 to 2:10 pm: **Conference 6929: Behavior and Mechanics of Multifunctional and Composite Materials**

Marcelo J. Dapino, The Ohio State Univ.

2:10 to 2:25 pm: **Conference 6930: Industrial and Commercial Applications of Smart Structures Technologies**

L. Porter Davis, Honeywell, Inc.

2:25 to 2:40 pm: **Conference 6931: Nanosensors and Microsensors for Bio-Systems**

Vijay K. Varadan, Univ. of Arkansas

2:40 to 2:55 pm: **Conference 6932: Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems**

Masayoshi Tomizuka, Univ. of California/ Berkeley

2:55 to 3:15 pm: Coffee Break

3:15 to 3:30 pm: **Conference 6933: Smart Sensor Phenomena, Technology, Networks, and Systems**

Wolfgang Ecke, IPHT Jena (Germany)

3:30 to 3:45 pm: **Conference 6934: Nondestructive Characterization for Composite Materials, Aerospace Engineering, Civil Infrastructure, and Homeland Security**

Peter J. Shull, The Pennsylvania State Univ.

3:45 to 4:00 pm: **Conference 6935: Health Monitoring of Structural and Biological Systems**

Tribikram Kundu, The Univ. of Arizona

Monday 10 March

8:00 to 8:15 am

Golden West Room

Awards and Announcements:

2008 SSM Lifetime Achievement Award

Presented to

Dr. Arthur E. Clark, Clark Associates Inc.

Dr. Clark's background expertise is in the area of solid-state physics and electronic devices. During the period 1960–1970, Dr. Clark emerged as one of the leading U.S. scientists in magnetic and magnetoelastic effects. A whole new era in magnetostrictive materials was opened up with his discovery of giant magnetostrictions at cryogenic temperatures in the heavy rare earth metals. Heretofore, magnetostrictions were limited to 10–100 ppm. Dr. Clark's work revealed the existence of magnetostrains of 10,000 ppm. His work on the magnetoelastic properties of the rare earths received worldwide attention. By the mid 1970s, Dr. Clark's reputation had established the Naval Surface Warfare Center as the world's leading laboratory in magnetoelasticity. Of prime interest were the advances made by him in the magnetostrictive rare earth compounds. He discovered that by combining the rare earths with Fe, the huge rare earth magnetostrictions could be lifted from the cryogenic region to above room temperature. Magnetostrictions at room temperature exceeded previous values by 30 fold (magnetostrictive energies by 1000 fold). With the development of new magnetostrictive materials came the potential of high power sonar projectors, magnetostrictive valves, and variable acoustic delay lines. Magnetostrictive materials with both huge 'positive' and 'negative' strains were obtained. Of major importance is the unprecedented "ΔE Effect" or change in sound velocity with magnetic field which makes available variable frequency resonators and variable acoustic delay lines. Dr. Clark and his coworkers developed texturing methods to obtain magnetomechanical coupling factors > 0.72, exceeding those of the piezoceramics widely used in all major sonar systems.

As leader at the Naval Surface Warfare Center's magnetics group, Dr. Clark was the Navy's foremost authority on magnetoelasticity. His work was cited in the AAAS publication "Science" as the critical research leading to the newest high energy product permanent magnetics, the NdFeB magnets now commonly available worldwide. He was the recipient of the first Naval Surface Warfare Center "Science and Technology" Award, two Meritorious Civilian Service Awards at the Naval Surface Warfare Center, and an Award of Merit for Group Achievement. In May 1994, he was the recipient of an honorary "Doctor of Technology" degree at the Lund Institute of Technology, University of Lund, Sweden. Dr Clark's most recent contributions include development of the structural magnetostrictive iron-gallium alloys being called Galfenol and research on transitioning the alloy to devices. Galfenol alloys are novel high bandwidth alloys for use in actuator and/or sensor in applications that place the alloy in tension, bending and compression. Additionally, these alloys are can be welded, machined and perform over a wide temperature range, significantly expanding the design space for smart material applications.

2008 NDE Lifetime Achievement Award

Presented to

Dr. Michael Kröning, Director
Fraunhofer Institut Zerstörungsfreie Prüfverfahren (Germany)

Prof. Dr. Michael Kröning received his Ph.D. in experimental nuclear physics from the Johannes Gutenberg-University in Mainz in 1974 where he continued as a researcher through 1978. Dr. Kröning then joined Siemens KWU where he organized and established the NDT laboratory became head of the Department for Component Inspection and QA. He developed a number of new inspection systems and techniques for specific applications in the nuclear industry, and also developed company procedures for qualified NDT performance. His special achievements include ultrasonic inspection techniques for austenitic welds in stainless steel piping for intergranular stress corrosion cracking (IGSCC). The systems and procedures he developed were among the first that passed the EPRI qualification procedures for both manual and automated detection and sizing of IGSC-cracks. His achievements also include development of µ-NDT systems, based on well-known NDT principles or by introducing new physical principles to characterize micro structures, layers and interfaces with high resolution. In 1990 Dr. Kröning became Director of the Fraunhofer-Institut for Nondestructive Testing IZFP and the professor at Saarland University, Saarbrücken, as chair for nondestructive testing and quality assurance. At IZFP, he was able to develop new process-integrated nondestructive testing techniques to control and monitor industrial processes, characterize properties of structural and functional materials, and to find and evaluate defect conditions in a generic meaning of product quality and safety. His expertise and leadership has resulted in IZFP Saarbrücken to emerge as the premier Institute in this area of specialisation internationally. Prof. Dr. Kröning has created technology platforms for major NDT techniques to meet the specific requirements of the various industries in a short time and an cost effective basis. To overcome barriers arising from formal QM-systems he established a center for innovative NDT applications that is accredited in accordance with European codes to validate new NDT methods and techniques. He has organized international cooperation to disseminate a common understanding of NDT, including both scientific and industrial aspects, which is mandatory for international trade and cooperation under WTO.

From 2000 until October 2003 Prof. Kröning was invited from the Governing Board to the position of Executive Director of the International Science and Technology Center (ISTC) in Moscow. In October 2003 Prof. Kröning returned to his position as Director of the Fraunhofer-Institut for Nondestructive Testing IZFP and professor at the Saarland University, Saarbrücken, as chair for nondestructive testing and quality assurance. Prof. Kröning is an Honorary Fellow and Professor of over seven societies and universities in the Russian Federation and India, served as a member of the German Reactor Safety Committee from 1992 - 1999 and has been an active and productive member of many NDT technical societies and advisory boards.

8:15 to 8:30 am

Funding Agency Talk: Current and Future Programs and Initiatives

NSF Talk

Eduardo Misawa, National Science Foundation (NSF)

8:30 to 9:15 am

Plenary Presentation

Mechamatronics and the Automotive Industry

Nancy Johnson, Manager, Vehicle Development Research Lab., General Motors

The automobile today is primarily a mechanical system focused on the conversion of energy from a variety of forms into mechanical effort and desired motion. Consequently, automobile designers and engineers have traditionally taken mechanically-oriented approaches to solving problems or enhancing the performance and functionality of the automobile. Unfortunately, this way of looking at problems limits the options available and in some cases has restricted solutions to those more bulky, massive, inflexible and expensive than would otherwise be desired. Expanding the solution domain beyond the purview of traditional mechanical approaches can enhance the realization of more optimal solutions. This presentation introduces the notion that "Mechamatronics," the integration of mechanical systems, smart materials and electronics, offers new degrees-of-freedom for achieving this goal.

Monday 10 March

Mechamatronics is evolving from high-end, one of kind products for medical, military and aerospace applications to the point of viability for mainstream, high-yield/low-cost products for automotive applications. For the automotive industry, there are significant potential benefits to be realized including reduction in vehicle mass, added design flexibility and reduction in component size and cost. This presentation will give an historical overview of the use of smart materials in the automotive industry, describe many of the smart materials based applications under consideration, and review GM's approach to transitioning the technology into actual products.

Nancy Johnson is a Lab Group Manager at GM Research & Development. She has responsibility for managing technical projects in the areas of automotive applications for smart materials, structural composites and crashworthiness. She has over 50 technical publications, 39 U.S. patents and 80 published patent applications on smart material enabled devices. Nancy also leads GM's global mechamatronics team which focuses on the integration of mechanical systems, smart materials, and electronics into breakthrough automotive technologies.

Nancy is a Fellow of the American Society for Mechanical Engineering (ASME) where she is actively involved with the Adaptive Structures and Material Systems and Applied Mechanics Division Composite Materials Committees. She is also a Fellow of the American Society for Composites (ASC) of which she is a founding member. She has served as a member of the Energy Management Working Group, Automotive Composites Consortium (ACC) (1991–2004) and served first as member and then Chairman of that organizations Focal Project III (1999 – 2004). She is a widely acknowledged leader in the areas of automotive applications of both composite and smart materials and has given invited plenary presentations at American Society for Composites, Cancom, and Cansmart Technical Conferences. She is the recipient of the D.R. Harting Award from the Society for Experimental Mechanics and the John M. Campbell Award, 2000, an annual General Motors award established to recognize recent outstanding contributions to pure or applied science.

9:15 to 10:00 am

Plenary Presentation

High-Power Magnetostrictive Materials from Cryogenic Temperatures to High Temperatures

Dr. Arthur E. Clark, Clark Associates Inc.

In this presentation, we discuss the huge magnetically induced displacements magneto-strictions) based upon the element terbium (Terfenol's) as well as modern magnetostrictive non-rare earth materials based upon common b.c.c. Fe (Galfenol's). Magnetostrictive performance of these alloys from cryogenic temperatures to over 250°C will be discussed. In the terbium containing alloys, a proper balance of magnetic anisotropy and magnetostriction, plus a proper choice of crystal axes lead to materials switches large quantities of energy between the internal (magnetic) and external (mechanical) states. Magnetostrictions far exceed 1000 ppm at room temperature. Energy densities are 2000 times those of conventional magnetostrictive materials and 10 – 20 times those of typical piezoceramics. Recently developed iron-based magnetostrictive materials containing the element gallium (Galfenol), in addition to yielding large magnetostrictions (the highest recorded in 3-D metallic alloys), also possess important structural properties. The physical mechanism underlying the magnetostriction, while not understood, differs from that of the rare-earth based materials is still under investigation. This presentation will emphasize recent advances in the Fe-Ga (Galfenol) alloy system, including research on substitutional and interstitial alloying additions. A novel feature of the Galfenol alloys is the ability to build a uniaxial anisotropy into the material, which mimics a compressive prestress. This uniaxial anisotropy allows these materials to be magnetostrictively active in both tensile, zero stress, as well as the compressive stress regions, a unique trait among high power active materials of any type. The Fe-based materials are particularly valuable for systems where large energy transduction is needed under both tensile and compressive conditions, such as active structures and active vibration control, and in difficult cases of shock and explosive environments.

Dr. Clark's background expertise is in the area of solid-state physics and electronic devices. During the period 1960–1970, Dr. Clark emerged as one of the leading U.S. scientists in magnetic and magnetoelastic effects. A whole new era in magnetostrictive materials was opened up with his discovery of giant magnetostrictions at cryogenic temperatures in the heavy rare earth metals. Heretofore, magnetostrictions were limited to 10–100 ppm. Dr. Clark's work revealed the existence of magnetostrains of 10,000 ppm. His work on the magnetoelastic properties of the rare earths received worldwide attention. By the mid 1970s, Dr. Clark's reputation had established the Naval Surface Warfare Center as the world's leading laboratory in magnetoelasticity. Of prime interest were the advances made by him in the magnetostrictive rare earth compounds. He discovered that by combining the rare earths with Fe, the huge rare earth magnetostrictions could be lifted from the cryogenic region to above room temperature. Magnetostrictions at room temperature exceeded previous values by 30 fold (magnetostrictive energies by 1000 fold). With the development of new magnetostrictive materials came the potential of high power sonar projectors, magnetostrictive valves, and variable acoustic delay lines. Magnetostrictive materials with both huge 'positive' and 'negative' strains were obtained. Of major importance is the unprecedented "ΔE Effect" or change in sound velocity with magnetic field which makes available variable frequency resonators and variable acoustic delay lines. Dr. Clark and his coworkers developed texturing methods to obtain magnetomechanical coupling factors > 0.72, exceeding those of the piezoceramics widely used in all major sonar systems.

As leader at the Naval Surface Warfare Center's magnetics group, Dr. Clark was the Navy's foremost authority on magnetoelasticity. His work was cited in the AAAS publication "Science" as the critical research leading to the newest high energy product permanent magnetics, the NdFeB magnets now commonly available worldwide. He was the recipient of the first Naval Surface Warfare Center "Science and Technology" Award, two Meritorious Civilian Service Awards at the Naval Surface Warfare Center, and an Award of Merit for Group Achievement. In May 1994, he was the recipient of an honorary "Doctor of Technology" degree at the Lund Institute of Technology, University of Lund, Sweden. Dr Clark's most recent contributions include development of the structural magnetostrictive iron-gallium alloys being called Galfenol and research on transitioning the alloy to devices. Galfenol alloys are novel high bandwidth alloys for use in actuator and/or sensor in applications that place the alloy in tension, bending and compression. Additionally, these alloys are can be welded, machined and perform over a wide temperature range, significantly expanding the design space for smart material applications.

Monday 10 March

10th Annual EAP-in-Action Session and Demonstrations

Golden West Room

Monday 10 March . . . . . 4:30 to 5:45 pm

Moderator: **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 he first Human/EAP-Robot Armwrestling Contest was held in 2005.

In 2008 we will have the 10th anniversary of our EAPAD Conference and we are going to celebrate it with exciting demonstrations from 8 groups representing the following countries: Australia, China, Italy, New Zealand, Switzerland, and the USA. These demos will include various novel EAP actuators, prototypes and emerging products such as artificial fish, synthetic flower that opens and closes, a camera auto focus drive, tunable optics, an energy harvester, and possibly a giant blimp. We may even have new EAP arm to wrestle with but, till we reach the baseline human capability that we established in 2006, the focus will be on measuring the speed and force of the robot arm.

Prof. Adam Summers, UC Irvine

Prof. Adam Summers, keynote speaker for the conference on Electroactive Polymer Actuators and Devices: "The keratin-over-bone composite material of the parrot's beak is a wonderful example of a self-sharpening sacrificial surface layered onto a dynamically remodeled supporting structure."

Tentative EAP Demonstrations:

Geoffrey Spinks, Univ. of Wollongong (Australia)
Demonstrating: Fast polyprrole benders and the robotic "fish"

Jinsong Leng, Harbin Institute of Technology (China)
Demostrating: A flower that opens when it gets warm—using shape-memory polymers

Federico Carpi, Univ. of Pisa (Italy)
Demonstrating: Contractile folded dielectric elastomer actuators and buckling dielectric elastomer actuators

Iain Anderson, Auckland Bioengineering Institute (New Zealand) and **Emilio Calius,** Industrial Research Ltd. (New Zealand)
Demonstrating: Applications of Dielectric Elastomer Minimum Energy Structure (DEMES) bending actuators.
Note: A wrestling arm is currently being developed and may be ready for this session.

Silvain Michel, Federal Labs. for Materials Testing and Research/EMPA (Switzerland)
Demonstrating: Model blimp with EAP-driven control surfaces

Manuel Aschwanden, Optotune (Switzerland)
Demonstrating: Tunable optical elements based on dielectric elastomer actuators

Charlie Duncheon, Artifical Muscle, Inc.
Demonstrating: The latest prototypes and products at AMI

Seiki Chiba and **Roy Kornbluh,** SRI International and Hyper Drive Corp.
Demonstrating: New dielectric elastomer EAP actuated prototypes

For current up-to-date information on this session, please go to http://ndeaa.jpl.nasa.gov/nasa-nde/lommas/eap/EAPIA/EAP-in-Action-Session-2008.html

Panel Discussion

Bringing Smart Structures Products to Market

Royal Palm II/III

Monday 10 March . . . . . 12:20 to 1:40 pm

Panel Moderators: **Janet Sater,** Institute for Defense Analyses; **Eric Anderson,** CSA Engineering, Inc.

The original idea for this award was broached during off-line discussions among symposium technical planning committee members of the SPIE Smart Structures and Materials Symposium in 1997-and the first award was given in 1998. This award recognizes 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.

This year marks the 10th anniversary of the first award, an appropriate time to examine productization of the smart materials and structures field. In March 2007, Dr. Eric Anderson and Dr. Janet Sater presented a brief review (SPIE 6527-02) addressing then current status of the winning products. This year we are inviting past winners of the award to come and discuss their experiences in transitioning a product to market; this is an opportunity for members of the community to hear directly from them and to interact with them. Particular emphasis will be given on issues associated with such transitions. Invited speakers include Porter Davis, Honeywell; Jim Hubbard, PhotoSense; Brian Soller, Luna Innovations; Jim Toscano, Lord Corporation; Daryoush Allaei, QRDC; Amrita Kumar, Acellent Technologies; Ernie Havens, Cornerstone Research; Conor Johnson, CSA Engineering; and Kenji Uchino, ICAT/PSU and Micromechatronics. Each speaker will be given 5 to 10 minutes to address several specific questions such as the following:

* How did the product transition to market?
* What were the primary factors that contributed to the product's transition (or lack of transition)?
* Did the product change the business and business model?
* What lessons were learned in the transition process?

Then we will open up the discussion to questions and comments from the audience. Please come and attend what promises to be an interesting and informative discussion!

Welcome Reception

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

All attendees are invited to relax, socialize, and enjoy refreshments at the Tiki Pavilion Poolside.

Please remember to wear your conference badge. Dress is casual.

Tuesday 11 March

8:00 to 8:05 am

Golden West Room

Awards and Announcements:

ASME/SPIE Best Student Paper Award and ASME Best Paper Award

8:05 to 8:20 am

Funding Agency Talk: Current and Future Programs and Initiatives

NIST Talk

H. Felix Wu, National Institute of Technology and Standards

8:20 to 9:05 am

Plenary Presentation

Airbus Airframe Innovation: The Future Role of Smart Structures

Dr. Henrik Rösner, Manager, External Relations Department, Center of Competence Structure, Airbus Structural Enginnering

The Airbus vision is of a 'green' aviation industry, avoiding any negative environmental impact. Already the latest products, A380 and the A350XWB are part of the new 'eco-efficient' aircraft family, reducing fuel consumption and minimizing the environmental impact as a step towards the 'green' vision. Clear targets have been set, such as, for instance, a 50% reduction in CO_2 emissions by 2020. In general, environmental efficiency is our customers' major expectation as well as being the key product decision criterion for lowering operational costs.

Structure engineering is one of the most important engineering disciplines contributing to the 'eco-efficiency' of an aircraft. To enable improvements and in particular step changes in this field technological innovation is mandatory. However, new technologies must be applied carefully and extensively validated to enable continuous evolution of an aircraft airframe without drawbacks.

The 'Airbus® intelligent airframe' development philosophy is fostering innovation, which comprises development of intelligent solutions with regard to best innovative materials, advanced design, and also smart structures with intelligent characteristics. Thus, there are three elements to the intelligent airframe development philosophy. Firstly, best use of innovative materials leads to the application of an exceptionally high percentage of various new, high-performance material solutions. The second consideration is the airframe design and the way it is built, which is as important as the use of innovative materials. The aircraft has to be built in an innovative way and the materials integrated into one optimized solution. The third new emerging element, on which this paper is focusing, incorporates what is known as 'smart structures and materials', where usually sensors and actuators enable controlled reactions to the environment and specific conditions. Thus, in future airframes self-adaptivity, self-monitoring and self-healing properties will be implemented. For example, a 'noise reduction system' using sensors and actuators along the aircraft can actively reduce noise vibration; 'structural health monitoring' places sensors within the airframe itself: sensors which can detect initial damage and so reduce maintenance work and enable new design philosophies.

Smart structures and materials solutions have been discussed for years. However, new enabling technologies in the area of sensor-actuators and material development are required to enable widespread civil airframe industrial applications. Particularly, some limiting factors such as robustness, long-term durability, reparability or self-controlling ability must be over come. The characteristic of smart structures development in civil aviation is the need for multidisciplinary competences from various engineering disciplines such as structures, systems and flight physics. Research and technology programs are ongoing in this technological area, and upcoming Airbus programs already implement the first smart structures stepwise, as for instance the A350XWB adaptive wing solutions.

The 'Airbus® intelligent airframe' solutions, in particular smart structures and materials, are also motivated by the bionics spirit where design principles taken from nature are transferred into technological applications. Nature perfectly optimizes design under given boundary conditions and ensures best efficient use of material and energy. Conventional material or design-focused solutions might often experience physical limitations. On the contrary, new smart structures solutions, integrating material-sensor/actuator functions could overcome current limitations.

Dr. Henrik Rösner studied material science at the University of Saarland, Germany, and received his master in material engineering in 1998. Henrik Rösner has held the position of research scientist at the Fraunhofer Institute for Nondestructive Testing IZFP until 2001. His research and project lead focused on nondestructive testing, electromagnetic and thermographic methods for material characterization, and particularly nondestructive evaluation of fatigue damage in lightweight materials at the University of Dayton Research Institute UDRI within the scope of DARPA Multidisciplinary University Research Initiative. Henrik Rösner received his Ph.D. in material engineering from the University of Saarland in Saarbrücken in 2003. Since 2001 Dr. Henrik Rösner is working for Airbus, since 2002 in the manager position leading the central function and department External Relations, Center of Competence Structure within Airbus Structure Engineering.

Student Lunch with the Experts A Networking Event

Tuesday 11 March. . . . . 12:30 to 1:30 pm

See registration packet 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.

Posters/Exhibition Reception

Exhibition Hall, Town and Country Room

Tuesday 11 March. . . . . 6:00 to 7:30 pm

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

Poster Viewing Hours:

Tuesday & Wednesday . . . . . 10:00 am to 4:00 pm

Poster Setup

Poster presenters may set up between 10:00 am to 4:00 pm on Tuesday 11 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 12 March.

Wednesday 12 March

8:00 to 8:05 am

Golden West Room

Awards and Announcements:

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 SPIE's 2008 Smart Structures and Materials Symposium in front of a group of peers and potential customers. SPIE will publish information about the winner and the product in OE Reports; and 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.

8:05 to 8:20 am

Funding Agency Talk: Current and Future Programs and Initiatives

IVHM Program

Ashok N. Srivastava, NASA Ames Research Ctr.

8:20 to 9:05 am

Plenary Presentation

Implementing Smart Structures Technology in High-Consequence Applications

Dr. Charles R. Farrar, Los Alamos National Lab.

This talk will begin by citing examples of smart structure technology developed at Los Alamos National Laboratory (LANL) over the last 15 years that have made the transition from research to practice and the barriers faced with such implementation on in situ structures. The examples cited have the common theme of very high consequences applications because of their defense nature, the hazardous material they are applied to, and the very high costs associated with these structures. The presentation will then identify general issues that pose challenges when trying to implement new smart structures technology on real world systems. These issues include fundamental difficulties with funding new technology proof-of-principle demonstrations, the need for multidisciplinary technology development, and the need to perform studies in real world environments so that sources of variability can be assessed and quantified. The talk will conclude by raising questions regarding the ability of our current education paradigm to adequately train the next generation of engineers with the skill set necessary to transition smart structures technology from research to practice. Education programs that LANL is developing with the University of California/San Diego will be highlighted as an attempt to address some of the current shortcomings with tradition education models.

Chuck Farrar has 25 years experience as a technical staff member, project leader, and team leader at Los Alamos National Laboratory. He is currently the leader of The Engineering Institute at Los Alamos National Laboratory. While at Los Alamos, he earned a Ph.D. in civil engineering from the University of New Mexico in 1988. The first ten years of his career at LANL focused on performing experimental and analytical structural dynamics studies for a wide variety of systems including nuclear power plant structures subject to seismic loading, and weapons components subject to various portions of their stockpile-to-target loading environments. Currently, his research interests focus on developing integrated hardware and software solutions to structural health monitoring problems and the development of damage prognosis technology. The results of this research have been documented in more than 280 publications as well as numerous keynote lectures at international conferences. In 2000 he founded the Los Alamos Dynamics Summer School. His work has recently been recognized at Los Alamos through his reception of the inaugural Los Alamos Fellows Prize for Technical Leadership and by the Structural Health Monitoring community through the reception of the inaugural Lifetime Achievement Award in Structural Health Monitoring. He is currently working jointly with engineering faculty at University of California, San Diego to develop the Los Alamos/UCSD Engineering Institute with a research focus on Damage Prognosis. This initiative is also developing a formal, degree-granting educational program in the closely related areas of validated simulations and structural health monitoring. Additional professional activities include current appointments to associate editor positions for the International Journal of Structural Health Monitoring and Earthquake Engineering and Structural Dynamics, and the development of a short course entitled Structural Health Monitoring: A Statistical Pattern Recognition Approach that has been offered more than 15 times to industry and government agencies in Asia, Australia, Europe and the U.S. In 2007 he was elected to the position of Fellow in the American Society of Mechanical Engineers.

Thursday 13 March

8:00 to 8:05 am

Golden West Room

Announcements

8:05 to 8:20 am

Funding Agency Talk: Current and Future Programs and Initiatives

AFOSR Talk

Byung-Lip (Les) Lee, Air Force Office of Scientific Research (AFOSR)

8:20 to 9:05 am

Plenary Presentation

European Research Strategy in Aeronautics and Space: Smart Materials and Health Monitoring

Prof. Theodore Matikas, Univ. of Ioannina (Greece) and **Prof. Vassilis Kostopoulos,** Univ. of Patras (Greece)

The performance of the air transport sector as a whole is levelling off. New concepts and breakthrough technologies are needed to bring a new age of air flight. Air transport demand is predicted to double in the next 10 – 15 years and triple in 20 years time. This offers a significant opportunity for Europe, but also major challenges with regard to environmental effects, safety, security and affordability.

The European Union fully recognises the responsibility and independence of scientists in the definition of the broad lines of research at the frontiers of knowledge and it is promoting all necessary research activities, in particular by encouraging upstream research and integration of research activities. EU supports undertakings that include industry, small and medium-sized enterprises (SMEs), research centres and universities in their research and technological development activities, giving priority to those areas and projects where European funding and cooperation is of particular importance. Through its support for research at the frontiers of knowledge, applied research and innovation, the Community seeks to promote synergies in European research and thus provide a more stable foundation for the European Research Area (ERA).

A major objective of this specific plenary presentation is to provide information on the Seventh Framework Programme (FP7) which is the European Union's (EU) chief instrument for funding scientific research and technological development over the period 2007 to 2013 in several areas, including Aeronautics (which is part of transport sub-theme) and Space. This presentation will also provide information on European Commission Support Actions aimed at facilitating the SME participation in EU funded research projects. The aim of the presentation is to facilitate networking among the attendees, as well as with European aeronautics, space and related sectors for joint research proposals and activities, particularly in the areas of smart materials and health monitoring. Under the FP7, the European Commission is proposing a 'greener' and 'smarter' pan-European transport system, supported by a research budget of €5.2 billion over seven years. The EU's new 'technology platforms' have been major contributors to defining the EU's future transport research strategies. The FP7 also seeks to stimulate the ongoing restructuring of the transport industry, including the integration of the supply chain and, in particular, SMEs, key players that provide needed dynamism and innovation. The Joint Technology Initiative (JTI) concept is one of the major novelties of the FP7. This instrument represents a clear decision to support research of long duration.

The presentation will also provide overview of the European Technology Platforms (ETPs) and the ERA-Net Project Air Transport Net (AirTN).

Prof. Theodore Matikas specializes in the development of health monitoring methodologies for quantification of damage and life prediction of engineering materials and structures. He received his Ph.D. in Mechanics of Solids and Structures from the Université de Technologie de Compiègne, in France. He is currently Assoc. Professor at the Materials Science & Engineering Dept., University of Ioannina, Greece, holding this position since December 2004. In 2000, he joined the Greek Atomic Energy Commission and served as Director for Regulatory Policy, Safety, and Security. From 1997 to 1999 he was Professor at the Chemical & Materials Engineering Dept., University of Dayton, Ohio, USA and also served as Director of the Center for Materials Diagnostics, UDRI / United States Department of Defence. From 1991–1997 he served as Research Engineer at the U.S. Air Force Research Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio and led the in-house research program in ultrasonic non-destructive evaluation.

For his research achievements, Prof. Matikas has been honoured with a number of awards and fellowships. These include the Wohlleben/Hochwal Award and Certificate of Merit (in 1995 and 1999), US National Academy of Science & Engineering Award (in 1992), CNRS–France Research Award (in 1987), European Commission Research Fellowship (in 1988), as well as several best paper awards. He has served as Program Director and reviewer in numerous research projects sponsored by the National Science Foundation (NSF), Defence Advanced Research Projects Agency (DARPA), US Air Force Office of Scientific Research, General Secretariat for Research and Technology – Greece, European Commission DG TREN, among others. He has authored or co-authored over 120 scientific publications in professional journals and conference proceedings, 3 books and 6 patents, delivered over 150 presentations (more than 50 invited talks) around the world, and served as reviewer in many international journals. He also served as Chairman and member of Scientific Committees in international conferences and as Guest Editor in scientific journals. He currently serves as expert for the European Air Transport Net (AirTN) in the field of aeronautics materials and manufacturing, and he is member of the Euratom Scientific & Technical Committee, member of the Advisory Board of the Euratom Supply Agency, and National Delegate of FP6 Aerospace Program Committee and FP7 Euratom Program Committee.

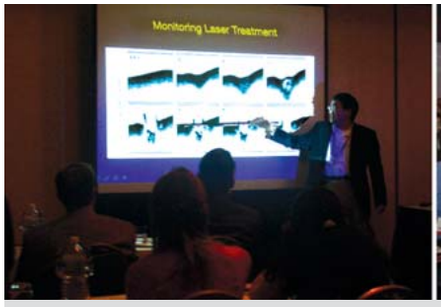
Professor Vassilis Kostopoulos specializes in the design and analysis of composite structures, nondestructive inspection and evaluation of aeronautical structures, health monitoring, fracture and fatigue of composite materials and structures, blast behavior of structures, anisotropic elasticity, anisotropic damage theory, and wave propagation and scattering in continuous media and non-linear acoustics.

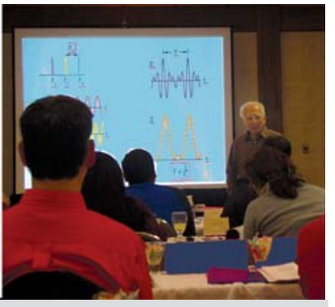
He received his Dip. Eng. degree in Mechanical Engineering in 1980 and his Ph.D. in Applied Mechanics (Wave Propagation & Scattering, Nondestructive testing and Composite Materials) in 1987, from the National Technical University of Athens, Greece. He is currently Professor and Head of the Department of Mechanical Engineering & Aeronautics, University of Patras, Greece, and Director of the Applied Mechanics Laboratory. From 1994–1996 he was Visiting Scientist at the JRC Petten, The Netherlands, Institute for Advanced Materials, European Union.

Professor Kostopoulos has authored 80 publications in referred journals and delivered over 150 presentations in International Conferences, including 32 invited lectures, and holds 6 patents, one European and five National ones. He was co-organizer of 35 International Conferences. He also was the Main Supervisor of 12 Ph.D. theses and has obtained research funding of more than 3.5 m€.

He served as National Delegate of FP6 Aerospace Program Committee (2003–2006), and currently serves as Member of the Advisory Council for Aerospace Research in Europe—ACARE (since 2003) and National Delegate of FP7 Transport (including Aeronautics) Program Committee (since 2007). He is elected Member of the Council of the European Society for Composite Materials (ESCM), Member of the Editorial Board of the Journal "Composite Science and Technology" and Member of the Editorial Board of the Journal "Mechanics of Advanced Materials and Structures".

SPIE Course



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Electroactive Polymer Actuators and Devices

SC634

Course level: Introductory
CEU .65 $480 / $570 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://ndeaa.jpl.nasa.gov/nasa-nde/yosi/yosi.htm

Kwang J. Kim is Professor and Chair of the Mechanical Engineering Department and Director of Active Materials and Processing Laboratory (AMPL) at the University of Nevada, Reno. His research interests are in a broad spectrum of Active Materials and Sensors.

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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Visit the Exhibition!

New location—Town and Country Room

Stay up-to-date on industry trends at this FREE Exhibition

SPIE Smart Structures/NDE

11–12 March 2008
Town and Country Resort & Convention Center
San Diego, California USA

Exhibition Hours:

Tuesday 11 March 2008 . . . . . 10:00 am to 4:00 pm
Poster Reception:. . . . . 6:00 pm to 7:30 pm
Wednesday 12 March 2008 . . . 10:00 am to 4:00 pm

Showcasing the latest tools, instruments, devices, and components in:

- **Materials, mathematics, and control**
- **Sensing, actuation, and damping**
- **Integrated systems for civil infrastructures**
- **Systems for industrial and commercial structures**
- **Electro-active polymer actuators and devices**
- **And much, much more!**

Don't miss this unique opportunity to meet the decision makers in Smart Structures/NDE!

Conference Session Schedule

	Conf. 6926	Conf. 6927	Conf. 6928	Conf. 6929	Conf. 6930	Conf. 6932	Conf. 6933	Conf. 6934	Conf. 6935
Monday									
8:00 to 10:00 am	Plenary Presentation								
10:30 am to 12:30 pm	Device Applications	EAP as Emerging Actuators and Biomimetric Technologies	Energy Harvesting and Scavenging I	Ferroelectrics I	Automotive Applications I	Keynote Session	Fiber Bragg Grating Sensors I		SHM for Aerospace Applications I
1:30 to 3:10 pm	Control of Smart Structures	Ionic/ Conductive EAP	Energy Harvesting and Scavenging II	Ferroelectric Materials: Characteriz-ation	Automotive Applications II	SHM/Damage Detection Sensors I	Piezoelectric and Integrated Sensors	Fiber Bragg Grating Sensors II		Guided Waves for SHM I
3:40 to 6:20 pm	Advanced Control	10th Annual EAP-in-Action Demonstration	Energy Harvesting and Scavenging III	Ferroelectric Materials: Modeling	Vibration Damping Applications	SHM/Damage Detection Sensors II	Novel Sensors I	High-Speed FBG Sensor Systems		Guided Waves for SHM II

Tuesday											
8:00 to 9:05 am	Plenary Presentation										
9:10 to 10:10 am	Aerospace Applications	IPMC I		Advanced Materials and Structures	Smart Materials and Structures Optimization	Ferroelectrics II	Space Applications	Damping I	Monitoring Systems	Sensor Systems for Monitoring in Wind Energy Applications		SHM for Aerospace Applications II
10:35 to 12:35 am	Hysteresis Control			Automotive and Transportation Systems	Modeling, Simulation, and Design of Controlled Systems I	Active Polymers	Aerospace Applications	Damping II	Ultrasonics for SHM	Fiber Optic Sensors in Energy		Nonlinear Methods for Damage Detection and SHM
1:30 to 3:10 pm	Invited Session: Information Management for Structural Health Monitoring	IPMC II		SMAs Integrated Systems I		Active Composites I	Future of SMA	Reconfigurable Systems	Modeling and Design of Smart Systems I	Wireless Sensors for SHM	NDE in Composite Materials and Aerospace Engineering	Next-Generation Sensing and Algorithmic Technologies for SHM
3:40 to 6:20 pm		Dielectric EAP Actuators I		SMAs Integrated Systems II		Active Composites II	Medical and Optical Applications	Wireless Sensors/ Networks	Novel Sensors II	Sensors for Structural Health Monitoring		Signal Processing and NDE for SHM

Conference Session Schedule

Wednesday

	Conf. 6926	Conf. 6927		Conf. 6928		Conf. 6929	Conf. 6931	Conf. 6932		Conf. 6933	Conf. 6934	Conf. 6935
8:00 to 9:05 am	Plenary Presentation											
9:10 to 10:10 am	Optimization and Health Monitoring	Dielectric EAP Actuators II		Smart Materials and Structures Optimization II		Future of SMA I		Damage Assessment: Wave Methods	Damage Detection	Distributed Sensors	Acoustic-Ultrasound NDE	SHM for Aerospace Applications III
10:30 am to 12:35 pm	Material Modeling I			MR Fluids Integrated Systems		Future of SMA II	Keynote Session Nano and Micro Devices for Biosensing I	Modeling and Mechanics	Fiber Optic Sensors for SHM	Polymer Optical Fiber Sensors		Modeling for SHM Applications I
1:30 to 3:10 pm	Material Modeling II	Modeling and Simulation		Biology Inspired Systems		Shape-Memory Materials I	Keynote Session Nanowire, Nanotubes, and Nanostructures	Signal Processing I	SHM for Composite Materials	Sensors for Non Destructive Evaluation	Applied Imaging	Novel Instrumentation and Sensing for SHM I
3:40 to 6:00 pm		Energy Harvesting using EAP		Civil Systems		Shape-Memory Materials II	Micro/Nano Devices and MEMS	Signal Processing II	Vibration SHM and Other Sensors	Fiber Optic Sensors in Civil Engineering	Civil Infrastructure Health Monitoring	SHM for Civil Infrastructure Applications

Thursday

8:00 to 9:05 am	Plenary Presentation											
9:10 to 11:15 am		Application of EAP to Robotics	Other EAP	Integrated Systems in Bionics and Nature-Inspired Technologies	Aircraft and MAV/UAV Systems	Magnetic Shape-Memory Alloys I	Nano and Micro Devices for Biosensing II	Energy Harvesting and Storage	Signal Processing and Damage Detection I		Wireless Sensor Networks and Remote Sensing	Signal Processing for SHM
10:35 to 12:15 am			Applications of EAP to Optical Devices	Integration of Active/Passive Materials and Devices into Integrated Systems I	Modeling, Analysis, and Design of Structural Sensing and Actuation in Integrated Systems	Magnetic Shape-Memory Alloys II	Nano Biosensors	SHM/Damage Detection Methods I	Signal Processing and Damage Detection II		Progess in NDE	Modeling for SHM Applications II
1:30 to 4:40 pm		Applications of EAP to Actuation and Transduction		Integration of Active/Passive Materials and Devices into Integrated Systems II	Morphing Structures and Aircrafts	Magnetostric-tive Materials I	Systems Application	SHM/Damage Detection Methods II	Modeling and Design of Smart Systems II		Homeland Security Applications	Novel Instrumentation and Sensing for SHM II
3:40 to 6:20 pm				Active/Semi-Active/Passive Vibration Control	Flexible Robotic Systems	Magnetostric-tive Materials II			Wireless for SHM		Detection in Structural and Mechanical Systems	Biological and Medical Applications

Technical Conferences

Conference 6926

Room: Sunset

Monday-Wednesday 10-12 March 2008
Proceedings of SPIE Vol. 6926

Modeling, Signal Processing, and Control II

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

Program Committee: **Michael A. Demetriou,** Worcester Polytechnic Institute; **Mary I. Frecker,** The Pennsylvania State Univ.; **Karolos M. Grigoriadis,** Univ. of Houston; **Scott W. Hansen,** Iowa State Univ.; **Hans Irschik,** Johannes Kepler Univ. Linz (Austria); **Katherine J. Jones,** Rice Univ.; **Jaehwan Kim,** Inha Univ. (South Korea); **Andrew J. Kurdila,** Virginia Polytechnic Institute and State Univ.; **Arnold Lumsdaine,** The Univ. of Tennessee; **S. O. Reza Moheimani,** The Univ. of Newcastle (Australia); **Stefan S. Seelecke,** North Carolina State Univ.; **Emílio Carlos Nelli Silva,** Escola Politécnica da Univ. de São Paulo (Brazil); **Robert E. Skelton,** Univ. of California/San Diego; **Ralph C. Smith,** North Carolina State Univ.; **Wieslaw Jerzy Staszewski,** The Univ. of Sheffield (United Kingdom); **Miao Yu,** Univ. of Maryland/College Park

Conference 6927

Room: Golden West

Monday-Thursday 10-13 March 2008
Proceedings of SPIE Vol. 6927

Electroactive Polymer Actuators and Devices (EAPAD) X

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

Conference Co-Chair: **Emilio P. Calius,** Industrial Research Ltd. (New Zealand)

Program Committee: **Ray Henry Baughman,** The Univ. of Texas at Dallas; **Václav Bouda,** Czech Technical Univ. in Prague (Czech Republic); **Danilo De Rossi,** Univ. degli Studi di Pisa (Italy); **Toribio Fernandez-Otero,** Univ. Politécnica de Cartagena (Spain); **Edwin W. H. Jager,** Micromuscle AB (Sweden); **Keiichi Kaneto,** Kyushu Institute of Technology (Japan); **Jaehwan Kim,** Inha Univ. (South Korea); **Kwang J. Kim,** Univ. of Nevada/Reno; **Gabor M. Kovacs,** EMPA (Switzerland); **Roy D. Kornbluh,** SRI International; **Jinsong Leng,** Harbin Institute of Technology (China); **Wen-Liang Liu,** Industrial Technology Research Institute (Taiwan); **John David W. Madden,** The Univ. of British Columbia (Canada); **Chris Melhuish,** Univ. of Bristol (United Kingdom); **Jaedo Nam,** Sungkyunkwan Univ. (South Korea); **Siavouche Nemat-Nasser,** Univ. of California/San Diego; **Yoshihito Osada,** Hokkaido Univ. (Japan); **Qibing Pei,** Univ. of California/Los Angeles; **Subramaniam Radhakrishnan,** National Chemical Laboratory (India); **Mohsen Shahinpoor,** Environmental Robots, Inc.; **Elisabeth Smela,** Univ. of Maryland/College Park; **Peter Sommer-Larsen,** Danmarks Tekniske Univ. (Denmark); **Ji Su,** NASA Langley Research Ctr.; **Minoru Taya,** Univ. of Washington; **Gordon G. Wallace,** Univ. of Wollongong (Australia); **Thomas Wallmersperger,** Univ. Stuttgart (Germany); **Gary Zaiats,** RAFAEL Armament Development Authority Ltd. (Israel); **Qiming Zhang,** The Pennsylvania State Univ.

Conference 6928

Room: Royal Palm V

Monday-Thursday 10-13 March 2008
Proceedings of SPIE Vol. 6928

Active and Passive Smart Structures and Integrated Systems II

Conference Chair: **Mehdi Ahmadian,** Virginia Polytechnic Institute and State Univ.

Conference Co-Chair: **Mehrdad N. Ghasemi-Nejhad,** Univ. of Hawaii at Manoa; **Donald J. Leo,** Virginia Polytechnic Institute and State Univ.

Program Committee: **Gregory S. Agnes,** Jet Propulsion Lab.; **Eric H. Anderson,** CSA Engineering, Inc.; **Hiroshi Asanuma,** Chiba Univ. (Japan); **Amr M. Baz,** Univ. of Maryland/College Park; **Diann E. Brei,** Univ. of Michigan; **Gregory P. Carman,** Univ. of California/Los Angeles; **Aditi Chattopadhyay,** Arizona State Univ.; **Seung-Bok Choi,** Inha Univ. (South Korea); **William W. Clark,** Univ. of Pittsburgh; **Mohammad H. Elahinia,** Univ. of Toledo; **Alison B. Flatau,** Univ. of Maryland/College Park; **Farhan Gandhi,** The Pennsylvania State Univ.; **Ephrahim Garcia,** Cornell Univ.; **Victor Giurgiutiu,** Univ. of South Carolina; **Fernando D. Goncalves,** Lord Corp.; **Faramarz Gordaninejad,** Univ. of Nevada/Reno; **Nakhiah C. S. Goulbourne,** Virginia Polytechnic Institute and State Univ.; **Tristram T. Hyde,** NASA Goddard Space Flight Ctr.; **Daniel J. Inman,** Virginia Polytechnic Institute and State Univ.; **Conor D. Johnson,** CSA Engineering, Inc.; **Seung Jo Kim,** Seoul National Univ. of Technology (South Korea); **Jeong-Hoi Koo,** Miami Univ.; **George Andre Lesieutre,** The Pennsylvania State Univ.; **Wei-Hsin Liao,** The Chinese Univ. of Hong Kong (Hong Kong China); **Arnold Lumsdaine,** The Univ. of Tennessee; **John A. Main,** Defense Advanced Research Projects Agency; **Yuji Matsuzaki,** Nagoya Univ. (Japan); **Samir A. Nayfeh,** Massachusetts Institute of Technology; **Roger Ohayon,** Conservatoire National des Arts et Métiers (France); **Mohammad Rastgaar Aagaah,** Virginia Polytechnic Institute and State Univ.; **Dale Ruebsamen,** Honeywell, Inc.; **Steve C. Southward,** Virginia Polytechnic Institute and State Univ.; **Roger Stanway,** The Univ. of Sheffield (United Kingdom); **Friedrich K. Straub,** The Boeing Co.; **Jian Qiao Sun,** Univ. of Delaware; **Nader Vahdati,** Nanyang Technological Univ. (Singapore); **Kon-Well Wang,** The Pennsylvania State Univ.; **Norman M. Wereley,** Univ. of Maryland/College Park

Conference 6929

Room: California

Monday-Thursday 10-13 March 2008
Proceedings of SPIE Vol. 6929

Behavior and Mechanics of Multifunctional and Composite Materials II

Conference Chair: **Marcelo J. Dapino,** The Ohio State Univ

Conference Co-Chair: **Zoubeida Ounaies,** Texas A&M Univ

Program Committee: **Hilary Bart-Smith,** Univ. of Virginia; **Abhijit Bhattacharyya,** Univ. of Arkansas/Little Rock; **L. Catherine Brinson,** Northwestern Univ.; **Gregory P. Carman,** Univ. of California/Los Angeles; **Constantin Ciocanel,** Univ. of Toledo and Northern Arizona Univ.; **Christopher P. Henry,** Hughes Research Labs., LLC; **Marc Kamlah,** Forschungszentrum Karlsruhe GmbH (Germany); **Ibrahim Karaman,** Texas A&M Univ.; **Dimitris C. Lagoudas,** Texas A&M Univ.; **Chad M. Landis,** The Univ. of Texas at Austin; **Donald J. Leo,** Virginia Polytechnic Institute and State Univ.; **JiangYu Li,** Univ. of Washington; **Christopher S. Lynch,** Georgia Institute of Technology; **Karla M. Mossi,** Virginia Commonwealth Univ.; **Robert C. O'Handley,** Massachusetts Institute of Technology; **Etienne Patoor,** École Nationale Supérieure d'Arts et Métiers (France); **Ralph C. Smith,** North Carolina State Univ.

Conference 6930

Room: Royal Palm VI (Monday)
Royal Palm II (Tuesday

Monday-Tuesday 10-11 March 2008
Proceedings of SPIE Vol. 6930

Industrial and Commercial Applications of Smart Structures Technologies II

Conference Chair: **L. Porter Davis,** Honeywell, Inc.

Conference Co-Chair: **Benjamin Kyle Henderson,** Air Force Research Lab.; **M. Brett McMickell,** Honeywell International, Inc.

Program Committee: **Eric H. Anderson,** CSA Engineering, Inc.; **Emil Valentin Ardelean,** Schafer Corp.; **Christian Boller,** The Univ. of Sheffield (United Kingdom); **Peter C. Chen,** Catholic Univ. of America; **Kevin M. Farinholt,** Virginia Polytechnic Institute and State Univ.; **Xiaoyan Gong,** Medical Implant Mechanics, LLC; **Steven Fulton Griffin,** Boeing-SVS, Inc.; **Holger Hanselka,** Fraunhofer-Institut für Betriebsfestigkeit und Systemzuverlässigkeit (Germany); **David Ernest Havens,** Cornerstone Research Group, Inc.; **Mark R. Jolly,** Lord Corp.; **Chad H. Joshi,** Energen, Inc.; **Jayanth N. Kudva,** NextGen Aeronautics, Inc.; **Amrita Kumar,** Acellent Technologies, Inc.; **Ou Ma,** New Mexico State Univ.; **Anna-Maria Rivas McGowan,** NASA Langley Research Ctr.; **Geoffrey P. McKnight,** Hughes Research Labs., LLC; **Marc E. Regelbrugge,** Rhombus Consultants Group; **W. Lance Richards,** NASA Dryden Flight Research Ctr.; **Brian P. Sanders,** Air Force Research Lab.; **Janet M. Sater,** Institute for Defense Analyses

Conference 6931

Room: Royal Palm III

Wednesday-Thursday 12-13 March 2008
Proceedings of SPIE Vol. 6931

Nanosensors and Microsensors for Bio-Systems

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

Conference Co-Chair: **Andrei M. Shkel,** Univ. of California/Irvine

Program Committee: **Pratul K. Ajmera,** Louisiana State Univ.; **Steven W. Arms,** MicroStrain, Inc.; **Joachim F. Baumann,** Siemens AG (Germany); **Bharat Bhushan,** The Ohio State Univ.; **James L. Blackshire,** Air Force Research Lab.; **D. L. Carroll,** Wake Forest Univ.; **Jung-Chih Chiao,** The Univ. of Texas at Arlington; **Sang H. Choi,** NASA Langley Research Ctr.; **Jürg Dual,** ETH Zürich (Switzerland); **Andras Der,** Biological Research Ctr. (Hungary); **Lukas M. Eng,** Technische Univ. Dresden (Germany); **Cläs-Göran Granqvist, Sr.,** Uppsala Univ. (Sweden); **Peter Heszler, Sr.,** (Sweden); **Michael H. W. Hoffmann,** Univ. Ulm (Germany); **Laszlo Bela Kish,** Texas A&M Univ.; **Nikhil A. Koratkar,** Rensselaer Polytechnic Institute; **Shriram Kumar,** Univ. of Arkansas; **Chih-Hao Lee,** National Tsing Hua Univ. (Taiwan); **Eric Lifshin,** SUNY/Univ. at Albany; **Cheng Luo,** Louisiana Tech Univ.; **William H. Marlow,** Texas A&M Univ.; **Conrad Masterson,** Nanotechnology Foundation of Texas, Inc.; **Kathryn M. McGrath,** Univ. of Otago (New Zealand); **Norbert G. Meyendorf,** Fraunhofer-Institut für Zerstörungsfreie Prüfverfahren (Germany); **Bernd Michel,** Fraunhofer-Institut für Zuverlässigkeit und Mikrointegration (Germany); **Y. Eugene Pak,** Consultant (South Korea); **Yeonjoon Park,** NASA Langley Research Ctr.; **Yongrae Roh,** Kyungpook National Univ. (South Korea); **Paul B. Ruffin,** U.S. Army Aviation and Missile Research, Development and Engineering Ctr.; **Gabor Schmera,** Space and Naval Warfare Systems Ctr., San Diego; **Ananth Selvarajan,** Indian Institute of Science (India); **Kyo D. Song,** Norfolk State Univ.; **Ashok Srivastava,** Louisiana State Univ.; **Maria Strømme,** Uppsala Univ. (Sweden); **Joseph A. Turner,** Univ. of Nebraska/Lincoln; **Lode K.J. Vandamme,** Technische Univ. Eindhoven (Netherlands); **Tian-Bing Xu,** National Institute of Aerospace; **Kazushi Yamanaka,** Tohoku Univ. (Japan); **Kaiming Ye,** Univ. of Arkansas

Conference 6932

Room: Royal Palm I and II

Monday-Thursday 10-13 March 2008
Proceedings of SPIE Vol. 6932

Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems

Conference Chair: **Masayoshi Tomizuka,** Univ. of California/Berkeley

Conference Co-Chair: **Victor Giurgiutiu,** Univ. of South Carolina; **Chung-Bang Yun,** Korea Advanced Institute of Science and Technology (South Korea)

Program Committee: **H. Harry Asada,** Massachusetts Institute of Technology; **Amr M. Baz,** Univ. of Maryland/College Park; **Fabio Casciati,** Univ. degli Studi di Pavia (Italy); **Fu-Kuo Chang,** Stanford Univ.; **Chih-Chen Chang,** Hong Kong Univ. of Science and Technology (Hong Kong China); **Genda Chen,** Univ. of Missouri/Rolla; **Shirley J. Dyke,** Washington Univ.; **Silvia Ferrari,** Duke Univ.; **Alison B. Flatau,** Univ. of Maryland/College Park; **Yozo Fujino,** The Univ. of Tokyo (Japan); **Robert X. Gao,** Univ. of Massachusetts/Amherst; **Steven D. Glaser,** Univ. of California/Berkeley; **Faramarz Gordaninejad,** Univ. of Nevada/Reno; **Xiaoyan Han,** Wayne State Univ.; **Benjamin Kyle Henderson,** Air Force Research Lab.; **Haiying Huang,** Purdue Univ.; **Jerry Q. Huang,** The Boeing Co.; **Kumar V. Jata,** Air Force Research Lab.; **Jeong-Tae Kim,** Pukyong National Univ. (South Korea); **Ki Soo Kim,** Hoseo Univ. (South Korea); **Jan-Ming Ko,** The Hong Kong Polytechnic Univ. (Hong Kong China); **Francesco Lanza di Scalea,** Univ. of California/San Diego; **Shih-Chi Liu,** National Science Foundation; **Chin-Hsiung Loh,** National Taiwan Univ. (Taiwan); **Jerome Peter Lynch,** Univ. of Michigan; **Stephen A. Mahin,** Univ. of California/Berkeley; **Eduardo Misawa,** National Science Foundation; **Akira Mita,** Keio Univ. (Japan); **Satish Nagarajaiah,** Rice Univ.; **Siavouche Nemat-Nasser,** Univ. of California/San Diego; **Irving J. Oppenheim,** Carnegie Mellon Univ.; **Jinping Ou,** Harbin Institute of Technology (China); **Ser-Tong Quek,** National Univ. of Singapore (Singapore); **Tadanobu Sato,** Kyoto Univ. (Japan); **Rahmat A. Shoureshi,** Univ. of Denver; **Andrew W. Smyth,** Columbia Univ.; **Hoon Sohn,** Carnegie Mellon Univ.; **Billie F. Spencer, Jr.,** Univ. of Illinois at Urbana-Champaign; **Tsu-Chin Tsao,** Univ. of California/Los Angeles; **Ming L. Wang,** Univ. of Illinois/Chicago; **Jin Wen,** Drexel Univ.; **Zhishen Wu,** Ibaraki Univ. (Japan); **Youlin Xu,** The Hong Kong Polytechnic Univ. (Hong Kong China); **Hiroyuki Yamanouchi,** Building Research Institute (Japan); **Lily Li Zhou,** Nanjing Univ. of Aeronautics and Astronautics (China)

Conference 6933

Room: Royal Palm IV

Monday-Wednesday 10-12 March 2008
Proceedings of SPIE Vol. 6933

Smart Sensor Phenomena, Technology, Networks, and Systems

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

Conference Co-Chair: **Kara J. Peters,** North Carolina State Univ.; **Norbert G. Meyendorf,** Univ. of Dayton and Fraunhofer-Institut für Zerstörungsfreie Prüfverfahren

Program Committee: **Grigory Adamovsky,** NASA Glenn Research Ctr.; **Farhad Ansari,** Univ. of Illinois/Chicago; **George Y. Baaklini,** NASA Glenn Research Ctr.; **Horst J. Baier,** Technische Univ. München (Germany); **Xiaoyi Bao,** Univ. of Ottawa (Canada); **Hartmut Bartelt,** IPHT Jena (Germany); **Axel Berthold,** Fraunhofer-Institut für Zerstörungsfreie Prüfverfahren (Germany); **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); **Joseph Grant,** NASA Stennis Space Ctr.; **Wolfgang R. Habel,** Bundesanstalt für Materialforschung und -prüfung (Germany); **Daniele Inaudi,** Smartec SA (Switzerland); **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); **Jinsong Leng,** Harbin Institute of Technology (China); **Alexis Méndez,** MCH Engineering LLC; **Bernd Michel,** Fraunhofer-Institut für Zuverlässigkeit und Mikrointegration (Germany); **Jeff W. Miller,** Micron Optics, Inc.; **Marc Niklès,** Omnisens S.A. (Switzerland); **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 6934

Room: Royal Palm VI
(Tuesday-Wednesday
Sunset (Thursday)

Tuesday-Thursday 11-13 March 2008
Proceedings of SPIE Vol. 6934

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

Conference Chair: **Peter J. Shull,** The Pennsylvania State Univ

Conference Co-Chairs: **Dietmar W. Vogel,** Fraunhofer-Institut für Zuverlässigkeit und Mikrointegration (Germany); **Aaron A. Diaz,** Pacific Northwest National Lab.; **H. Felix Wu,** National Institute of Standards and Technology

Program Committee: **A. Emin Aktan,** Drexel Univ.; **Farhad Ansari,** Univ. of Illinois/Chicago; **George Y. Baaklini,** NASA Glenn Research Ctr.; **Yoseph Bar-Cohen,** Jet Propulsion Lab.; **Fu-Kuo Chang,** Stanford Univ.; **Andrew L. Gyekenyesi,** NASA Glenn Research Ctr.; **Garo K. Kiremidjian,** Sensametrics, Inc.; **James C. Leslie,** Advanced Composite Products and Technology, Inc.; **Richard E. Martin,** Cleveland State Univ.; **Aftab A. Mufti,** Univ. of Manitoba (Canada); **Didem Ozevin,** Physical Acoustics Corp.; **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.; **Glenn A. Washer,** Univ. of Missouri/Columbia; **Ying Zhang,** Georgia Institute of Technology

Conference 6935

Room: Sunrise

Monday-Thursday 10-13 March 2008
Proceedings of SPIE Vol. 6935

Health Monitoring of Structural and Biological Systems II

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,** St. Louis Univ.; **Yoseph Bar-Cohen,** Jet Propulsion Lab.; **Fu-Kuo Chang,** Stanford Univ.; **Bernd B. F. Frankenstein,** Fraunhofer-Institut für Zerstörungsfreie Prüfverfahren (Germany); **Olivier Giraudo,** ONERA (France); **Victor Giurgiutiu,** Univ. of South Carolina; **Wolfgang Grill,** Univ. Leipzig (Germany); **Shivan Haran,** Arkansas State Univ.; **Sridhar Krishnaswamy,** Northwestern Univ.; **Francesco Lanza di Scalea,** Univ. of California/San Diego; **Jerome Peter Lynch,** Univ. of Michigan; **Jennifer E. Michaels,** Georgia Institute of Technology; **Won-Bae Na,** Pukyong National Univ. (South Korea); **Perngjin Frank Pai,** Univ. of Missouri/Columbia; **Paul D. Panetta,** ; **Dominique Placko,** Ecole Normale Supérieure de Cachan (France); **Hoon Sohn,** Carnegie Mellon Univ.; **Michael D. Todd,** Univ. of California/San Diego; **Wei-Chih Wang,** Univ. of Washington; **Hwai-Chung Wu,** Wayne State Univ.; **Andrei N. Zagrai,** New Mexico Institute of Mining and Technology; **George Zentai,** Varian Medical Systems, Inc.

Monday • 10 March

Golden West Room

8:00 to 8:15 am: **Announcements and Awards**

8:15 to 8:30 am: **Funding Agency-NSF Talk**
Eduardo Misawa, National Science Foundation

8:30 to 9:15 am: **Plenary Presentation: Mechamatronics and the Automotive Industry**
Nancy Johnson, General Motors

9:15 to 10:00 am: **Plenary Presentation: High-Power Magnetostrictive Materials from Cryogenic Temperatures to High Temperatures**
Arthur Clark, Clark and Associates Inc.

10:00 to 10:30 am: Coffee Break

Conference 6926

SESSION 1

Sunset . . . . . .Mon. 10:30 am to 12:10 pm

Device Applications

Session Chair: **Diann E. Brei,** Univ. of Michigan

10:30 am: **Dynamic characterization and single-frequency cancellation performance of SMASH (SMA actuated stabilizing handgrip)**, Anupam Pathak, Diann E. Brei, Jonathan E. Luntz, Univ. of Michigan; Chris LaVigna, Nersesse Nersessian, Techno-Sciences Inc.. . . . . [6926-01]

10:50 am: **Finite element analysis of a 3-dimensional acoustic wave correlator response for variable acoustic modes**, Ajay C. Tikka, Said F. Al-Sarawi, Derek Abbott, The Univ. of Adelaide (Australia) . . . . . [6926-48]

11:10 am: **The development of a five-DOF magnetorheological fluid-based telerobotic haptic system**, Farzad Ahmadkhanlou, Gregory N. Washington, Stephen E. Bechtel, The Ohio State Univ. . . . . [6926-03]

11:30 am: **Techniques and considerations for driving piezoelectric actuators at high speed**, Andrew J. Fleming, The Univ. of Newcastle (Australia) . . . . . [6926-04]

11:50 am: **Modeling and simulation of a 2-DOF bidirectional electrothermal microactuator**, Caglar Elbuken, Nezih Topaloglu, Patricia M. Nieva, Univ. of Waterloo (Canada) . . . . . [6926-05]

Lunch Break . . . . . 12:10 to 1:40 pm

Conference 6927

SESSION 1

Golden West . .Mon. 10:30 am to 12:10 pm

EAP as Emerging Actuators and Biomimetric Technologies

Session Chair: **Yoseph Bar-Cohen,** Jet Propulsion Lab.; **Emilio P. Calius,** Industrial Research Ltd. (New Zealand)

10:30 am: **High-performance with a 'soft' skeleton: the shark cartilage composite (Keynote Presentation)**, Adam P. Summers, Univ. of California/Irvine. . . . . [6927-01]

11:10 am: **Humanlike robots as platforms for electroactive polymers (EAP)**, Yoseph Bar-Cohen, Jet Propulsion Lab. . . . . [6927-02]

11:30 am: **Designing components using smartMOVE(tm) EPAM technology**, Marcus A. Rosenthal, Al Zarrabi, Peter Gise, Jon Heim, Artificial Muscle, Inc. . . . . [6927-03]

11:50 am: **Elastomeric contractile actuators for hand rehabilitation splints**, Federico Carpi, Andrea Mannini, Danilo De Rossi, Univ. di Pisa (Italy) . . . . . [6927-04]

Lunch Break . . . . . 12:10 to 1:30 pm

Conference 6928

SESSION 1

Royal Palm V. .Mon. 10:30 am to 12:30 pm

Energy Harvesting and Scavenging I

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

10:30 am: **Multisource power harvesting for fuel-less air vehicles**, Adam M. Wickenheiser, Ephrahim Garcia, Cornell Univ. . . . . [6928-01]

10:50 am: **Scaling laws for vibration energy harvesters**, Robert C. O'Handley, Massachusetts Institute of Technology . . . . . [6928-02]

11:10 am: **High-efficiency, inductive vibration energy harvesters**, Robert C. O'Handley, Massachusetts Institute of Technology; Alan Sliski, Jesse Simon, Ferro Solutions, Inc.; David Bono, Massachusetts Institute of Technology; Jiankang Huang, Ferro Solutions, Inc.. . . . . [6928-03]

11:30 am: **Stiffness nonlinearity as a means for resonance frequency tuning and enhancing mechanical robustness of vibration power harvesters**, Jacob J. Loverich, Richard Geiger, Yiming Liu, Jeremy E. Frank, KCF Technologies, Inc. . . . . [6928-04]

11:50 am: **Microsolenoid electromagnetic power harvesting for vibrating systems**, Timothy Reissman, Joon S. Park, Ephrahim Garcia, Cornell Univ. . . . . [6928-05]

12:10 pm: **Vibrational energy harvesters with nonlinear compliance**, Steve G. Burrow, Lindsay Clare, Univ. of Bristol (United Kingdom). . . [6928-06]

Lunch Break . . . . . 12:30 to 1:50 pm

Conference 6929

SESSION 1

California. . . . .Mon. 10:30 am to 12:10 pm

Ferroelectrics I

Session Chairs: **Christopher S. Lynch,** Georgia Institute of Technology; **Karla M. Mossi,** Virginia Commonwealth Univ.

10:30 am: **A study exploring the feasibility of designing an integrated actuator and performance monitoring system using piezoelectric diaphragms**, Poorna Mane, Karla M. Mossi, Virginia Commonwealth Univ.; Robert Bryant, NASA Langley Research Ctr. . . . . [6929-01]

10:50 am: **Extended life PZT stack test fixture**, Mircea Badescu, Stewart Sherrit, Xiaoqi Bao, Jack B. Aldrich, Yoseph Bar-Cohen, Christopher M. Jones, Jet Propulsion Lab. . . . . [6929-02]

11:10 am: **Determination of effective piezoelectric coefficients of PZT thin films on a substrate**, Nicholas Zalachas, Forschungszentrum Karlsruhe GmbH (Germany) and Institut Francais de Mécanique Advancée (France); Bernd Laskewitz, Marc Kamlah, Forschungszentrum Karlsruhe GmbH (Germany); Klaus Prume, aixACCT Systems GmbH (Germany); Yuri Lapusta, Institut Francais de Mécanique Advancée (France); Stephan Tiedke, aixACCT Systems GmbH (Germany). . . . . [6929-03]

11:30 am: **A novel evaluation of piezoelectric coefficient of PZT thin film**, Tien-Kan Chung, Kotekar P. Mohanchandra, Chia-Ming Chang, Gregory P. Carman, Univ. of California/Los Angeles. . . . . [6929-04]

11:50 am: **The effect of environmental temperature on the performance of piezoelectric transformers**, Chih-Kung Lee, Kuan-Ting Chen, Yu-yih Chen, Chung-Chun Ho, Dong-Sheng Wu, National Taiwan Univ. (Taiwan) . . . . . [6929-05]

Lunch Break . . . . . 12:10 to 1:30 pm

Conference 6930

SESSION 1

Royal Palm VI . Mon. 10:20 am to 12:00 pm

Automotive Applications I

Session Chairs: **Holger Hanselka,** Fraunhofer-Institut für Betriebsfestigkeit und Systemzuverlässigkeit (Germany); **Marc E. Regelbrugge,** Rhombus Consultants Group

10:20 am: **General Motors/University of Michigan smart materials and structures collaborative research laboratory the first year**, Diann E. Brei, Jonathan E. Luntz, John A. Shaw, Univ. of Michigan; Kenneth A. Strom, Nancy L. Johnson, Paul W. Alexander, Nilesh Mankame, Alan L. Browne, General Motors Corp. . . . . [6930-01]

10:40 am: **Active material reversible attachments: shape-memory polymer based**, Alan L. Browne, Nancy L. Johnson, General Motors Corp.; Thomas B. Stanford, William Barvosa-Carter, HRL Labs., LLC. . . . . [6930-02]

11:00 am: **Behavioral model and experimental validation for spool-packaged shape-memory alloy actuators**, John A. Redmond, Diann E. Brei, Jonathan E. Luntz, Univ. of Michigan; Alan L. Browne, Nancy L. Johnson, General Motors Corp. . [6930-03]

11:20 am: **SMArt (Shape-Memory Alloy ReseTable) spring lift for pedestrian protection**, Brian M. Barnes, Jonathan E. Luntz, Diann E. Brei, Univ. of Michigan; Kenneth A. Strom, Alan L. Browne, Nancy L. Johnson, General Motors Corp.. . . . . [6930-04]

11:40 am: **Experimental investigation of active adaptability of the SMArt (SMA ReseTable) dual-chamber pneumatic lift device for pedestrian protection**, James S. Otten, Jonathan E. Luntz, Diann E. Brei, Univ. of Michigan; Kenneth A. Strom, Alan L. Browne, Nancy L. Johnson, General Motors Corp.. . . . . [6930-05]

Lunch Break . . . . . 12:00 to 2:00 pm

Golden West Room

8:00 to 8:15 am: **Announcements and Awards**

8:15 to 8:30 am: **Funding Agency-NSF Talk**
Eduardo Misawa, National Science Foundation

8:30 to 9:15 am: **Plenary Presentation: Mechamatronics and the Automotive Industry**
Nancy Johnson, General Motors

9:15 to 10:00 am: **Plenary Presentation: High-Power Magnetostrictive Materials from Cryogenic Temperatures to High Temperatures**
Arthur Clark, Clark and Associates

10:00 to 10:30 am: Coffee Break

Conference 6930 Continued

Panel Discussion: Bringing Smart Structures Products to Market

Royal Palm ii/iii . . . . .Mon. 12:20 to 1:40 pm

Panel Moderators: **Janet M. Sater,** Institute for Defense Analyses; **Eric H. Anderson,** CSA Engineering, Inc.

The idea for the Smart Structures Product Implementation Award was conceived during off-line discussions among symposium technical planning committee members of the SPIE Smart Structures and Materials Symposium in 1997, and the first award was given in 1998. This award recognizes those individuals or companies who have taken the critical step of transitioning smart structures technologies into viable industrial and commercial products. These visionaries are necessary for the field of smart structure science and engineering to be recognized and accepted in the world at large.

2008 marks the 10th anniversary of the first award, an appropriate time to examine productization of the smart materials and structures field. In March 2007, Dr. Eric Anderson and Dr. Janet Sater presented a brief review (SPIE 6527-01) addressing then current status of the winning products. This year we are inviting past winners of the award to come and discuss their experiences in transitioning a product to market; this is an opportunity for members of the community to hear directly from them and to interact with them. Particular emphasis will be given on issues associated with such transitions. Invited speakers include Porter Davis, Honeywell; Jim Hubbard, PhotoSense; Brian Soller, Luna Innovations; Jim Toscano, Lord Corporation; Daryoush Allaei, QRDC; Amrita Kumar, Acellent Technologies; Ernie Havens, Cornerstone Research; Conor Johnson, CSA Engineering; and Kenji Uchino, ICAT/PSU and Micromechatronics. Each speaker will be given 5 to 10 minutes to address several specific questions such as the following:

- How did the product transition to market?
- What were the primary factors that contributed to the product's transition (or lack of transition)?
- Did the product change the business and business model?
- What lessons were learned in the transition process?

Then we will open up the discussion to questions and comments from the audience. Please come and attend what promises to be an interesting and informative discussion!

The 2008 Smart Structures Product Implementation Award will be given on Wednesday March 12. SPIE will publish information about the winner and the product in OE Reports; and 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.

Conference 6932

SESSION 1

Royal Palm II/III . . . . . .Mon. 10:20 am to 12:00 pm

Keynote Session

Session Chairs: **Chung-Bang Yun,** Korea Advanced Institute of Science and Technology (South Korea); **Victor Giurgiutiu,** Univ. of South Carolina

10:20 am: **Opening Remarks,** Masayoshi Tomizuka, Univ. of California/Berkeley

10:30 am: **Decentralized structural health monitoring using smart sensors** *(Invited Paper)*, Bill F. Spencer, Jr., Univ. of Illinois at Urbana-Champaign . . . . . [6932-159]

11:15 am: **Foundational advances in RNA engineering for constructing integrated biosensing and bioactuation devices in living systems** *(Invited Paper)*, Christina Smolke, California Institute of Technology . . . . . [6932-160]

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

***Indicates oral presentations that will be included in the NSF poster session*

Conference 6933

SESSION 1

Royal Palm IV . Mon. 10:30 am to 12:10 pm

Fiber Bragg Grating Sensors I

Session Chairs: **Wolfgang Ecke,** IPHT Jena (Germany); **Kara J. Peters,** North Carolina State Univ.

10:30 am: **Fiber optic sensor-based SHM technologies for aerospace applications in Japan** *(Invited Paper)*, Nobuo Takeda, The Univ. of Tokyo (Japan) . . . . . [6933-01]

11:10 am: **High-accuracy fiber optic localization for bend sensing and end-point detection**, Roger G. Duncan, Mark E. Froggatt, Matthew T. Raum, Luna Innovations Inc. . . . . [6933-02]

11:30 am: **Effects of coating and diametric load on fiber Bragg gratings as cryogenic temperature sensors**, Meng-Chou Wu, Ruth H. Pater, Stanton L. DeHaven, NASA Langley Research Ctr.. . . [6933-03]

11:50 am: **Micron-sized optical fiber sensor interrogation system**, Nezih Mrad, Ministry of National Defence (Canada). . . . . [6933-04]

Lunch Break . . . . . 12:10 to 1:30 pm

Conference 6935

SESSION 1

Sunrise . . . . . .Mon. 10:30 am to 11:50 pm

SHM for Aerospace Applications I

Session Chairs: **Tribikram Kundu,** The Univ. of Arizona; **Wolfgang Grill,** Univ. Leipzig (Germany)

10:30 am: **Real-time dual-channel ultrasonic imaging of composite aircraft structures**, Igor N. Komsky, Sridhar Krishnaswamy, Northwestern Univ.; Bob Lasser, Imperium, Inc. . . . . [6935-01]

10:50 am: **Detection of impact damage on thermal protection systems using thin-film piezoelectric sensors for integrated structural health monitoring**, Jeong K. Na, Samuel J. M.Kuhr, Univ. of Dayton Research Institute; Kumar V. Jata, Air Force Research Lab. . . . . [6935-02]

11:10 am: **Detection of disbonds in a honeycomb composite structure using guided waves**, Harsh K. Baid, Univ. of California/Los Angeles; Sauvik Banerjee, St. Louis Univ.; Ajit K. Mal, Univ. of California/Los Angeles; Shiv P. Joshi, NextGen Aeronautics, Inc.. . . . . [6935-03]

11:30 am: **Embedded nonlinear ultrasonics for structural health monitoring of satellite joints**, Andrei N. Zagrai, New Mexico Institute of Mining and Technology; Brandon J. Arritt, Air Force Research Lab.; Derek Doyle, New Mexico Institute of Mining and Technology . . . . . [6935-04]

Lunch Break . . . . . 11:50 to 1:30 pm

SESSION 2

Sunset . . . . . .Mon. 1:40 to 3:00 pm

Control of Smart Structures

Session Chair: **William S. Galinaitis,** Rose-Hulman Institute of Technology

1:40 pm: **Precision displacement control of a piezoelectric flextensional actuator**, Benjamin J. Nickless, James E. Hubbard, Jr., Univ. of Maryland/College Park; Tian-Bing Xu, National Institute of Aerospace; Ji Su, NASA Langley Research Ctr. . . . . [6926-06]

2:00 pm: **Advanced control algorithms for a SDOF piezoelectric nano-positioning stage**, Alexander York, Stefan S. Seelecke, North Carolina State Univ. [6926-07]

2:20 pm: **Modeling and control of piezoelectric stack actuator using a weighted directed graph**, William S. Galinaitis, Rose-Hulman Institute of Technology. . . . . [6926-08]

2:40 pm: **Switching sliding mode control for a membrane strip with MFC actuators**, Jamil M. Renno, Andrew J. Kurdila, Daniel J. Inman, Virginia Polytechnic Institute and State Univ. . . . . [6926-09]

Coffee Break. . . . . 3:00 to 3:30 pm

SESSION 2

Golden West . . . . . .Mon. 1:30 to 3:10 pm

Ionic/Conductive EAP

Session Chairs: **John David W. Madden,** The Univ. of British Columbia (Canada); **Ji Su,** NASA Langley Research Ctr.

1:30 pm: **Fiber spinning and ink-jet printing: advances in conducting polymer device fabrication** *(Invited Paper)*, Gordon G. Wallace, Javad Foroughi, Charles Mire, Marc in het Panhuis, Geoffrey M. Spinks, Univ. of Wollongong (Australia) . . . . . [6927-05]

2:10 pm: **Enhancement of the electromechanical transduction properties of a silicone elastomer by blending with a conjugated polymer**, Federico Carpi, Giuseppe Gallone, Fabia Galantini, Danilo De Rossi, Univ. di Pisa (Italy) . . . . . [6927-06]

2:30 pm: **Carbon nanotube yarns: sensors, actuators, and current carriers**, Tissaphern Mirfakhrai, The Univ. of British Columbia (Canada); Mikhail Kozlov, Shaoli Fang, Mei Zhang, Ray H. Baughman, The Univ. of Texas at Dallas; John D. W.Madden, The Univ. of British Columbia (Canada) . . . . . [6927-07]

2:50 pm: **Characterization and modeling of conjugated polymer sensors**, Yang Fang, Xiaobo Tan, Andrew Temme, Michigan State Univ.; Gursel Alici, Univ. of Wollongong (Australia) . . . . . [6927-08]

Coffee Break. . . . . 3:10 to 3:40 pm

SESSION 2

Royal Palm V . . . . . Mon. 1:50 to 3:10 pm

Energy Harvesting and Scavenging II

Session Chairs: **Donald J. Leo,** Virginia Polytechnic Institute and State Univ.; **Henry A. Sodano,** Arizona State Univ.

1:50 pm: **Ambient energy harvesting using ferroelectric materials**, Daniel Guyomar, Gaël Sebald, Sébastien Pruvost, Mickaël Lallart, Institut National des Sciences Appliquées de Lyon (France) . . . . . [6928-07]

2:10 pm: **Energy management of multicomponent power harvesting systems**, Timothy Reissman, Robert B. MacCurdy, Ephrahim Garcia, Cornell Univ. . . . . [6928-09]

2:30 pm: **Power conditioning for energy harvesting**, Lindsay Clare, Steve G. Burrow, Univ. of Bristol (United Kingdom) . . . . . [6928-10]

2:50 pm: **Parameter optimization of a magnetostrictive vibration-based energy harvester**, Thiago Seuaciuc-Osório, Mohammed Daqaq, Clemson Univ. . . . . [6928-11]

Coffee Break. . . . . 3:10 to 3:40 pm

SESSION 2

California. . . . . .Mon. 1:30 to 3:10 pm

Ferroelectric Materials: Characterization

Session Chairs: **Gregory P. Carman,** Univ. of California/Los Angeles; **JiangYu Li,** Univ. of Washington

1:30 pm: **Compositional dependence of single-crystal PMN-xPT phase transformations**, Christopher S. Lynch, Kyle Webber, Georgia Institute of Technology. . . . . [6929-06]

1:50 pm: **Experimental study of the electro-mechanical switching behavior of a piezoelectric stack actuator**, Alexander York, Stefan S. Seelecke, North Carolina State Univ. . . . . [6929-07]

2:10 pm: **Multilayer piezoelectric stack actuator characterization**, Stewart Sherrit, Christopher M. Jones, Jack B. Aldrich, Chad Blodget, Xioaqi Bao, Mircea Badescu, Yoseph Bar-Cohen, Jet Propulsion Lab. . . . . [6929-08]

2:30 pm: **Material parameter measurements for ferroelectrics using the partial unloading method**, Dayu Zhou, Qimonda Dresden GmbH & Co. OHG (Germany); Ruo Yu Wang, Marc Kamlah, Bernd Laskewitz, Yixiang Gan, Forschungszentrum Karlsruhe GmbH (Germany) . . . . . [6929-09]

2:50 pm: **Inhomogeneous creep fields in PZT: an experimental study**, Qida Liu, Univ. of Cambridge (United Kingdom); John E. Huber, Univ. of Oxford (United Kingdom) . . . . . [6929-10]

Coffee Break. . . . . 3:10 to 3:40 pm

SESSION 2

Royal Palm VI . . . . . .Mon. 2:00 to 4:40 pm

Automotive Applications II

Session Chairs: **Janet M. Sater,** Institute for Defense Analyses; **Holger Hanselka,** Fraunhofer-Institut für Betriebsfestigkeit und Systemzuverlässigkeit (Germany)

2:00 pm: **Establishment of the NSF industry/university cooperative research center on smart vehicle concepts**, Raj Singh, Marcelo J. Dapino, Gregory N. Washington, The Ohio State Univ. . . . . [6930-06]

2:20 pm: **Model-based design of fluid rectification valves for smart material electro-hydrostatic actuator (EHA)**, Thomas E. Walters, Marcelo J. Dapino, The Ohio State Univ.. . . . . [6930-07]

2:40 pm: **Drop tests of a magnetorheological energy absorber**, Min Mao, Wei Hu, Young-Tai Choi, Norman M. Wereley, Univ. of Maryland/College Park; Alan L. Browne, John C. Ulicny, General Motors Corp.. . . . . [6930-08]

Coffee Break. . . . . 3:00 to 3:40 pm

3:40 pm: **Nonlinear force feedback control of piezoelectric-hydraulic pump actuator for automatic transmission shift control**, Gi-Woo Kim, Kon-Well Wang, The Pennsylvania State Univ. . . . . [6930-09]

4:00 pm: **Motorcycle-waste heat-energy harvesting smart vehicles workshop**, Alexander D. Schlichting, Virginia Polytechnic Institute and State Univ. and Carnegie Mellon Univ.; Steven R. Anton, Daniel J. Inman, Virginia Polytechnic Institute and State Univ. . . . . [6930-10]

4:20 pm: **Thermoelectrics as elements of hybrid-electric vehicle thermal energy systems**, Leon M. Headings, Gregory N. Washington, The Ohio State Univ. . . . . [6930-11]

Sessions 2 and 3 run concurrently with sessions 4 and 5.

SESSION 2

Royal Palm I . . . . . .Mon. 1:30 to 3:10 pm

SHM/Damage Detection Sensors I

Session Chairs: **Daniele Inaudi,** Smartec SA (Switzerland); **Akira Mita,** Keio Univ. (Japan)

1:30 pm: **Structural health monitoring method for curved concrete bridge box girders**, Branko Glisic, Angelo Figini, Daniele Posenato, Daniele Inaudi, Smartec SA (Switzerland). . . . . [6932-06]

1:50 pm: **Innovative non-contact impedance-based structural health monitoring method**, Jialai Wang, The Univ. of Alabama at Tuscaloosa[6932-07]

2:10 pm: **Cement-matrix magnetostrictive smart composites**, Jialai Wang, The Univ. of Alabama at Tuscaloosa. . . . . [6932-08]

2:30 pm: ****Distributed structural sensing by carbon nanotube-based thin film skins**, Kenneth J. Loh, Tsung-Chin Hou, Jerome P. Lynch, Nicholas A. Kotov, Univ. of Michigan . . . . . [6932-09]

2:50 pm: **Concrete structure monitoring based on built-in piezoelectric ceramic transducers**, Xiaoyan Zhao, Dalian Univ. of Technology (China) . [6932-10]

Coffee Break. . . . . .3:10 to 3:40 pm

SESSION 4

Royal Palm II/III . . . . Mon. 1:50 to 3:10 pm

Piezoelectric and Integrated Sensors

Session Chairs: **Gangbing Song,** Univ. of Houston; **H. Harry Asada,** Massachusetts Institute of Technology

1:50 pm: **A geometrically nonlinear mixed finite element formulation for the simulation of piezoelectric shell structures**, Sven O. Klinkel, Katrin Schulz, Univ. Karlsruhe (Germany) . [6932-17]

2:10 pm: **Comparison of shape reconstruction strategies in a complex flexible structure**, Zhu Mao, Michael D. Todd, Univ. of California/San Diego . . . . . [6932-18]

2:30 pm: **Damage identifying algorithm for concrete structures based on smart piezoelectric transducer array**, Wei Sun, Shi Yan, Shenyang Architectural and Civil Engineering Univ. (China); Gangbing Song, Univ. of Houston . . . . . [6932-19]

2:50 pm: **Structural health monitoring using PZT sensors, comprehensive study, and applications**, Venu G. M.Annamdas, Nanyang Technological Univ. (Singapore); Annamdas K. Harish, Thatipamula Radhika, Jawaharlal Nehru Technological Univ. (India) . . . . . [6932-20]

Coffee Break. . . . . .3:10 to 3:40 pm

SESSION 2

Royal Palm IV . . . . . .Mon. 1:30 to 3:10 pm

Fiber Bragg Grating Sensors II

Session Chairs: **Kara J. Peters,** North Carolina State Univ.; **Wolfgang Ecke,** IPHT Jena (Germany)

1:30 pm: **Fiber Bragg grating sensors and SHM applications: a market overview** *(Invited Paper)*, Alexis Mendez, MCH Engineering LLC . . . [6933-05]

2:10 pm: **Dielectrically packaged fiber Bragg grating strain and temperature sensors**, Don Snyder, Steve Ferguson, Tom W. Graver, Micron Optics, Inc.; Alexis Mendez, MCH Engineering LLC. . . . . [6933-06]

2:30 pm: **Local strain measure of Kevlar strand with fiber optic Bragg grating**, Curtis E. Banks, NASA Marshall Space Flight Ctr.; Shawn Arnett, Texas Research International, Inc. . . . . [6933-07]

2:50 pm: **Packaging of surface relief fiber Bragg gratings for harsh high-temperature environments**, Jonathan D. Young, Tyson L. Lowder, Stephen M. Schultz, Richard H. Selfridge, Brigham Young Univ. . . . . [6933-08]

Coffee Break. . . . . .3:10 to 3:40 pm

SESSION 2

Sunrise . . . . . .Mon. 1:30 to 3:10 pm

Guided Waves for SHM I

Session Chairs: **Francesco Lanza di Scalea,** Univ. of California/San Diego; **Hoon Sohn,** Carnegie Mellon Univ.

1:30 pm: **Sensing and actuation of smart chiral honeycombs**, Fabrizio L. Scarpa, Univ. of Bristol (United Kingdom); Haim Abramovich, Technion-Israel Institute of Technology (Israel); Kong-Fah Tee, Univ. of Bristol (United Kingdom); Chris W. Smith, Ken E. Evans, The Univ. of Exeter (United Kingdom); Matthias Burgard, Michael Hoffmeister, Fraunhofer-Institut für Produktionstechnik und Automatisierung (Germany). . . . . [6935-06]

1:50 pm: **Recent advances on pipe inspection using guided waves generated by electromagnetic acoustic transducers**, Milos Vasiljevic, Tribikram Kundu, The Univ. of Arizona; Wolfgang Grill, Evgeny Twerdowski, Univ. Leipzig (Germany) . . . . [6935-07]

2:10 pm: **Passive-only wave-based structural health monitoring from ambient noise**, Karim G. Sabra, Georgia Institute of Technology; Ankit Srivastava, Univ. of California/San Diego; Adelaide Duroux, Georgia Institute of Technology; Francesco Lanza di Scalea, Ivan Bartoli, Univ. of California/San Diego . . . . . [6935-08]

2:30 pm: **Instantaneous crack detection using dual PZT transducers**, Seung Bum Kim, Carnegie Mellon Univ.; Hoon Sohn, Korea Advanced Institute of Science and Technology (South Korea) [6935-09]

2:50 pm: **Ultrasonic wireless sensor network and automated data analysis algorithms for health monitoring of structural components**, Sauvik Banerjee, Beshara Sholy, Kyle Mitchell, St. Louis Univ. . . . . [6935-10]

Coffee Break. . . . . .3:10 to 3:40 pm

SESSION 3

Sunset . . . . . .Mon. 3:30 to 4:50 pm

Advanced Control

Session Chair: **Jens Twiefel,** Leibniz Univ. Hannover (Germany)

3:30 pm: **Digital signal processing for an adaptive phase-locked loop controller on a FPGA-based platform**, Jens Twiefel, Leibniz Univ. Hannover (Germany); Holger Krüger, Carlos Paiz, Martin Klubal, Univ. Paderborn (Germany) . . . . . [6926-11]

3:50 pm: **Cooperative behavior of mobile robots as a macro-scale analogous of the quantum harmonic oscillator**, Gerasimos G. Rigatos, Industrial Systems Institute (Greece) . . . . . [6926-12]

4:10 pm: **Force control of a shape-memory alloy wire using fuzzy controller**, Omid Rohani, Aghil Yousefi-Koma, Ayyoub Rezaeeian, Alireza Doost-Hosseini, Univ. of Tehran (Iran) . . . . . [6926-13]

4:30 pm: **Fuzzy control of flexible structure using piezoelements**, Alireza Doosthoseini, Univ. of Tehran (Iran); Aghil Yousefi-Koma, Univ. of Tehran (Iran) and Tehran Univ. of Medical Sciences (Iran); Behrouz Shasti, Univ. of Tehran (Iran); Omid Rohani, Univ. of California/Irvine (Iran) . . . . . [6926-14]

Golden West . . . . . .Mon. 4:30 to 5:45 pm

Tenth Annual EAP-in-Action and Demonstrations

Panel Moderator: **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 he first Human/EAP-Robot Armwrestling Contest was held in 2005.

In 2008 we will have the 10th anniversary of our EAPAD Conference and we are going to celebrate it with exciting demonstrations from 8 groups representing the following countries: Australia, China, Italy, New Zealand, Switzerland, and the USA. These demos will include various novel EAP actuators, prototypes and emerging products such as artificial fish, synthetic flower that opens and closes, a camera auto focus drive, tunable optics, an energy harvester, and possibly a giant blimp. We may even have new EAP arm to wrestle with but, till we reach the baseline human capability that we established in 2006, the focus will be on measuring the speed and force of the robot arm.

Includes EAP Demonstrations: See Special Events for tentative list.

SESSION 3

Royal Palm V. . . . . .Mon. 3:40 to 5:40 pm

Energy Harvesting and Scavenging III.

Session Chairs: **Nakhiah C. S. Goulbourne,** Virginia Polytechnic Institute and State Univ.; **Gyuhae Park,** Los Alamos National Lab.

3:40 pm: **Performance comparison of implantable piezoelectric energy harvesters**, Changki Mo, William W. Clark, Univ. of Pittsburgh; Leon J. Radziemski, PiezoEnergy Technologies, LLC. . . . . [6928-13]

4:00 pm: **Thermal energy harvesting by piezo-SMA composite**, Onur C. Namli, Minoru Taya, Univ. of Washington . . . . . [6928-14]

4:20 pm: **Active broadband piezoelectric vibration energy harvesting**, Yiming Liu, KCF Technologies, Inc.; Heath F. Hofmann, The Pennsylvania State Univ.; Jeremy E. Frank, KCF Technologies, Inc. . . . . [6928-15]

4:40 pm: **Increasing the power scavenged by beam-mass systems from vibration sources**, Shahram M. Shahruz, Berkeley Engineering and Research, Inc.. . . . . [6928-16]

5:00 pm: **Self-tuning rotation energy harvesters**, Robert C. O'Handley, Steven Hall, Massachusetts Institute of Technology; Jesse Simon, Ferro Solutions, Inc.; David Bono, Massachusetts Institute of Technology; Alan Sliski, Jiankang Huang, Ferro Solutions, Inc.. . . . . [6928-17]

5:20 pm: **Piezoelectric energy harvesting from an L-shaped beam-mass structure**, Alper Erturk, Jamil M. Renno, Daniel J. Inman, Virginia Polytechnic Institute and State Univ.. . . . . [6928-19]

SESSION 3

California. . . . . .Mon. 3:40 to 5:40 pm

Ferroelectric Materials: Modeling

Session Chairs: **Marc Kamlah,** Forschungszentrum Karlsruhe GmbH (Germany); **William S. Oates,** Florida State Univ.

3:40 pm: **Reverse polarization switching in ferroelectric lead zirconate titanate (PZT) thin films**, William S. Oates, Florida State Univ. [6929-11]

4:00 pm: **Finite element simulation of ferroelectrics based on a micromechanical approach**, Mourad Elhadrouz, Ecole Nationale Supérieure d'Arts et Métiers (France) . . . . . [6929-12]

4:20 pm: **Rate-dependent incremental variational formulation of ferroelectricity**, Daniele Rosato, Christian Miehe, Univ. Stuttgart (Germany) [6929-13]

4:40 pm: **Micromechanical model of nonlinear relaxor ferroelectric phase transformation**, Kyle Webber, Christopher S. Lynch, Georgia Institute of Technology. . . . . [6929-14]

5:00 pm: **Oxygen vacancy diffusion, domain switching, and electromechanical behavior of ferroelectric perovskite**, JiangYu Li, Univ. of Washington . . . . . [6929-15]

5:20 pm: **Prediction of effective properties of short piezoelectric fiber composites using Eshelby's models**, Nilanjan Mallik, Univ. of Cincinnati[6929-16]

SESSION 3

Royal Palm VI . . . . . .Mon. 4:40 to 6:00 pm

Vibration Damping Applications

Session Chairs: **L. Porter Davis,** Honeywell, Inc.; **Geoffrey P. McKnight,** HRL Labs., LLC

4:40 pm: **Optimum design of MR damper based on FE analysis of electromagnetic field**, Xinchun Guan, Pengfei Guo, Jinping Ou, Harbin Institute of Technology (China). . . . . [6930-12]

5:00 pm: **A practical design method for TEP-GT MRFD**, Jinhai Li, Dalian Univ. of Technology (China); Xinchun Guan, Jinping Ou, Harbin Institute of Technology (China). . . . . [6930-13]

5:20 pm: **Active component and control design for torsional-mode vibration reduction for a parallel kinematic machine tool structure**, Reimund Neugebauer, Volker Wittstock, André Bucht, André Illgen, Fraunhofer-Institut für Werkzeugmaschinen und Umformtechnik (Germany) . . . . . [6930-15]

5:40 pm: **Manufacturing technique for robust and modular smart composites**, Baruch Pletner, Grace R. Kessenich, IPTRADE Inc.. . . . . [6930-16]

Sessions 2 and 3 run concurrently with sessions 4 and 5.

SESSION 3

Royal Palm I . . . . . .Mon. 3:40 to 6:00 pm

SHM/Damage Detection Sensors II

Session Chair: **Jialai Wang,** The Univ. of Alabama at Tuscaloosa; **Hoon Sohn,** Korea Advanced Institute of Science and Technology (South Korea)

3:40 pm: **Load monitoring in multiwire strands by interwire ultrasonic measurements**, Ivan Bartoli, Robert Phillips, Francesco Lanza di Scalea, Salvatore Salamone, Stefano Coccia, Univ. of California/San Diego; Charles S. Sikorsky, California State Dept. of Transportation . . . . . [6932-11]

4:00 pm: **Experimental investigation of fatigue behavior of smart CFRP cables embedded fiber Bragg grating sensors**, Wenli Chen, Hui Li, Jinping Ou, Harbin Institute of Technology (China); Wanxu Zhu, Yue Long, Liuzhou OVM Machinery Co., Ltd. (China) . . . . . [6932-12]

4:20 pm: **Miniaturized long period grating sensor interrogator based on a thermally tunable arrayed-waveguide grating demultiplexer**, Hong Lei Guo, Univ. of Ottawa (Canada); Gaozhi Xiao, National Research Council Canada (Canada); Jianping Yao D.D.S., Univ. of Ottawa (Canada); Nezih Mrad, Ministry of National Defence (Canada). . . . [6932-13]

4:40 pm: **Structure monitor system by use of optical fiber sensor and watching camera in utility tunnel in urban area**, Masahiro Nakano, Osaka Sangyo Univ. (Japan) . . . . . [6932-14]

5:00 pm: **Current developments in fiber Bragg grating sensors and their applications**, Venu G. M.Annamdas, Yaowen Yang, Nanyang Technological Univ. (Singapore) . . . . . [6932-15]

5:20 pm: **Local strain monitoring study of offshore platform T-shape tubular joint using fiber Bragg grating sensors**, Xuefeng Zhao, Dalian Univ. of Technology (China); Zhongdong Duan, Jinping Ou, Harbin Institute of Technology (China). . . . [6932-16]

5:40 pm: **Study on data acquisition system for living environmental information using robots for biofication of living spaces,** Norihisa Shimoyama, Akira Mita, Keio Univ. (Japan) . . . . . [6932-05]

SESSION 5

Royal Palm II/III . . . . Mon. 3:40 to 5:40 pm

Novel Sensors I

Session Chairs: **Xiaoyan Han,** Wayne State Univ.; **Alison B. Flatau,** Univ. of Maryland/College Park

3:40 pm: **Tunable mechanical monolithic sensor with interferometric readout for low-frequency seismic noise measurement**, Fabrizio Barone, 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) . . . . . [6932-22]

4:00 pm: **Laser interferometric sensor for seismic waves measurement**, Fausto Acernese, Univ. degli Studi di Salerno (Italy); Rosario De Rosa, Gerardo Giordano, Univ. degli Studi di Napoli Federico II (Italy); Rocco Romano, Fabrizio Barone, Univ. degli Studi di Salerno (Italy). . . . . [6932-23]

4:20 pm: ****A new sensor for web flutter measurement**, Aravind Seshadri, Prabhakar R. Pagilla, Oklahoma State Univ. . . . . [6932-24]

4:40 pm: ****Investigation of nonlinear effects of coupling materials in sonic IR imaging**, Xiaoyan Han, Yuyang Song, Garrett Godfrey, Wayne State Univ. . . . . [6932-25]

5:00 pm: **A novel shear stress sensor based on the electric double layer**, Chris J. Weiland, David J. Griffiths, Virginia Polytechnic Institute and State Univ.; Barbar J. Akle, Lebanese American Univ. (Lebanon) and Virginia Polytechnic Institute and State Univ.; Pavlos P. Vlachos, Donald J. Leo, Virginia Polytechnic Institute and State Univ. . . . . [6932-26]

5:20 pm: ****Characterization of the mechanical properties and sensing behavior of iron-gallium nanowire arrays**, Patrick R. Downey, Alison B. Flatau, Univ. of Maryland/College Park; Patrick D. McGary, Bethanie J. H.Stadler, Univ. of Minnesota. . . . . [6932-27]

SESSION 3

Royal Palm IV . . . . . .Mon. 3:40 to 5:40 pm

High-Speed FBG Sensor Systems

Session Chairs: **Alexis Mendez,** MCH Engineering LLC; **Michael D. Todd,** Univ. of California/San Diego

3:40 pm: **Fiber optic sensor networks for monitoring displacement and temperature fields in adaptive structures** *(Invited Paper)*, Horst J. Baier, Stephan Rapp, Technische Univ. München (Germany). . . . . [6933-09]

4:20 pm: **Improvement of FBG/PZT hybrid sensing system for composite materials**, Shinji Komatsuzaki, Seiji Kojima, Akihito Hongo, Hitachi Cable, Ltd. (Japan); Nobuo Takeda, The Univ. of Tokyo (Japan); Yasuhiro Koshioka, RIMCOF (Japan) . . . . . [6933-10]

4:40 pm: **Damage detection system with nanosecond resolution**, Eric Udd, Columbia Gorge Research . . . . . [6933-11]

5:00 pm: **The use of fiber Bragg gratings for ultrasound detection in anisotropic materials**, Graham J. Thursby, Brian Culshaw, Univ. of Strathclyde (United Kingdom); Moshe Tur, Yakov Botsev, Eyal Arad, Tel Aviv Univ. (Israel) . . [6933-12]

5:20 pm: **Rapid spectral interrogation enables advanced FBG sensing**, Wesley M. Kunzler, Jason Newman, Daniel Wilding, Zixu Zhu, Richard H. Selfridge, Stephen M. Schultz, Michael J. Wirthlin, Brigham Young Univ. . . . . [6933-13]

SESSION 3

Sunrise . . . . . .Mon. 3:40 to 6:20 pm

Guided Waves for SHM II

Session Chairs: **Hoon Sohn,** Carnegie Mellon Univ.; **Francesco Lanza di Scalea,** Univ. of California/San Diego

3:40 pm: **Design and characterization of the CLoVER transducer for structural health monitoring**, Ken I. Salas, Carlos E. S. Cesnik, Univ. of Michigan. . . . . [6935-11]

4:00 pm: **Lamb wave propagation in negative Poisson's ratio composites**, Chrystel Remillat, Paul D. Wilcox, Fabrizio L. Scarpa, Univ. of Bristol (United Kingdom) . . . . . [6935-12]

4:20 pm: **Structural health monitoring of aerospace applications with restricted geometry**, Roman T. Underwood, Eric D. Swenson, Som Soni, Air Force Institute of Technology . . . . . [6935-13]

4:40 pm: **Guided wave SHM with distributed sensor network**, Anthony J. Croxford, Paul D. Wilcox, Bruce W. Drinkwater, Univ. of Bristol (United Kingdom) . . . . . [6935-14]

5:00 pm: **Coupled NDE-durability approach for predicting life of insulated wires**, Galib Abumeri, Mohit Garg, AlphaSTAR Corp.; Ali Abdul-Aziz, NASA Glenn Research Ctr.; Francesco Lanza di Scalea, Ivan Bartoli, Univ. of California/San Diego. . . . . [6935-15]

5:20 pm: **Excited guided elastic waves of PZT fiber transducers and impact interaction in CFRP structures using 3D laser scanning vibrometry**, Lars Schubert, Martin Barth, Thomas Klesse, Bernd B. F.Frankenstein, Fraunhofer-Institut für Zerstörungsfreie Prüfverfahren (Germany) [6935-16]

5:40 pm: **Quantification of environmental compensation strategies for guided wave structural health monitoring**, Paul D. Wilcox, Anthony J. Croxford, Bruce W. Drinkwater, Univ. of Bristol (United Kingdom) . . . . . [6935-17]

6:00 pm: **Wireless structural health monitoring for critical members of civil infrastructures using piezoelectric active sensors**, Seunghee Park, Chung-Bang Yun, Korea Advanced Institute of Science and Technology (South Korea); Daniel J. Inman, Virginia Polytechnic Institute and State Univ.; Gyuhae Park, Los Alamos National Lab. . . [6935-82]

Golden West Room

8:00 to 8:05 am: **Announcements and Awards**

8:05 to 8:20 am: **Funding Agency-NIST Talk**
Felix Wu, National Institute of Standards and Technology

8:20 to 9:05 am: **Plenary Presentation: Airbus Airframe Innovation: The Future Role of Smart Structures**
Henrik Roesner, Airbus Structural Engineering

SESSION 4

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

Aerospace Applications

Session Chair: **Mary I. Frecker,** The Pennsylvania State Univ.

9:10 am: **Contact-aided compliant mechanisms for morphing aircraft skin**, Vipul Mehta, Mary I. Frecker, George A. Lesieutre, The Pennsylvania State Univ. . . . . [6926-15]

9:30 am: **Adaptive PI control of a smart projectile fin**, Venkat R. Mudupu, Sahjendra N. Singh, Woosoon Yim, Mohamed B. Trabia, Univ. of Nevada/Las Vegas. . . . . [6926-16]

9:50 am: **An application of D-FSMC in speediness track telescope direct drive system**, Xiaoli Lv, Hai Wang, Nanjing Institute of Astronomical Optics & Technology (China). . . . . [6926-17]

Coffee Break. . . . . 10:10 to 10:35 am

SESSION 4

Golden West . . Tues. 9:10 am to 12:15 pm

IPMC I

Session Chairs: **Kwang J. Kim,** Univ. of Nevada/Reno; **Jinsong Leng,** Harbin Institute of Technology (China)

9:10 am: **Advances in the modeling and performance of ionomeric polymer transducers (IPMCs)** *(Invited Paper)*, Donald J. Leo, Virginia Polytechnic Institute and State Univ. . . . . [6927-09]

9:50 am: **IPMC paints**, Kwang J. Kim, Il-Seok Park, Univ. of Nevada/Reno . . . . . [6927-10]

Coffee Break. . . . . 10:10 to 10:35 am

Session 4 runs concurrently with session 8.

SESSION 4

Royal Palm V. . . . . Tues. 9:10 to 10:50 am

Advanced Materials and Structures

Session Chairs: **William W. Clark,** Univ. of Pittsburgh; **Kon-Well Wang,** The Pennsylvania State Univ.

9:10 am: **Vibro-acoustics and wave propagation of novel chiral honeycombs**, Fabrizio L. Scarpa, Univ. of Bristol (United Kingdom); Massimo Ruzzene, Georgia Institute of Technology; Kong-Fah Tee, Univ. of Bristol (United Kingdom) . . . . . [6928-20]

9:30 am: **Characterization of porous substrates for biochemical energy conversion devices**, Stephen A. Sarles, Vishnu B. Sundaresan, Virginia Polytechnic Institute and State Univ.; Donald J. Leo, Virginia Polytechnic Institute and State Univ. . . . . [6928-21]

9:50 am: **Thermoelectric properties and micro-structures of CoSb3 and SiGe TE materials by spark plasma sintering**, Hee Seok Kim, Minoru Taya, Univ. of Washington; Pawan Gogna, Jet Propulsion Lab.[6928-22]

Coffee Break. . . . . 10:10 to 10:30 am

10:30 am: **A variable bending stiffness sandwich structure using fluidic flexible matrix composites (F2MC),** Suyi Li, Amir Lotfi, Ying Shan, Kon-Well Wang, Christopher D. Rahn, Charles E. Bakis, The Pennsylvania State Univ. . . . . [6928-84]

SESSION 8

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

Smart Materials and Structures Optimization

Session Chairs: **Steve C. Southward,** Virginia Polytechnic Institute and State Univ.

9:10 am: **Optimization and implementation of the smart joint actuator**, Justin E. Manzo, Ephrahim Garcia, Cornell Univ. . . . . [6928-38]

9:30 am: **Topology optimization of a plate coupled with acoustic cavity**, Amr M. Baz, Univ. of Maryland/College Park; Wael Akl, Ain Shams Univ.; Khalid Al-Mittani, Univ. of Maryland/College Park. . . . [6928-39]

9:50 am: **Turbomachinery blades damping by optimized shunted piezoelectric circuits**, Stephanie E. Livet, Snecma (France); Manuel Collet, Marc Berthillier, Univ. de Franche-Comté (France); Jean Pierrick, Snecma (France); Jean-Marc Cote, Univ. de Franche-Comté (France) . . . . . [6928-40]

Coffee Break. . . . . 10:10 to 10:35 am

SESSION 4

California. . . . . Tues. 9:10 to 10:10 am

Ferroelectrics II

Session Chairs: **Chad M. Landis,** The Univ. of Texas at Austin; **Minoru Taya,** Univ. of Washington

9:10 am: **Design of a new structural-health monitoring based on piezoelectric sensors for detection of strains of various amplitudes**, Chisato Wakabayashi, Minoru Taya, Hiroshi Sato, Univ. of Washington . . . . . [6929-18]

9:30 am: **Phase-field modeling of domain switching near crack tips in single-crystal ferroelectrics**, Chad M. Landis, The Univ. of Texas at Austin . . . . . [6929-96]

9:50 am: Experiment investigation for a new type of piezoelectric friction damper, Zhao Dahai, Hong-Nan Li, Dalian Univ. of Technology (China) . . . . [6929-20]

SESSION 4

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

Space Applications

Session Chairs: **Ou Ma,** New Mexico State Univ.; **M. Brett McMickell,** Honeywell International, Inc.

9:10 am: **Thermo-mechanical analysis of thin membranes and application in active flatness control design**, Xiaoyun Wang, Christian Sulik, Wanping Zheng, Yan-Ru Hu, Canadian Space Agency (Canada) . . . . . [6930-17]

9:30 am: **A multifunctional satellite structural architecture for operationally responsive space**, Brandon J. Arritt, Steven J. Buckley, Jeffrey M. Ganley, Jeffry S. Welsh, Air Force Research Lab.; Jeffrey C. Preble, John DiPalma, SpaceWorks, Inc.; Gregory V. Mehle, CSA Engineering, Inc.; R. Roopnarine, Honeybee Robotics . . . . . [6930-18]

9:50 am: **Cross-track infrared sounder isolation system**, Mario Gonzalez, Steve Hadden, Timothy A. Hindle, Honeywell Defense and Space Electronic Systems . . . . . [6930-19]

Coffee Break. . . . . 10:10 to 10:35 am

Golden West Room

8:00 to 8:05 am: **Announcements and Awards**

8:05 to 8:20 am: **Funding Agency-NIST Talk**
Felix Wu, National Institute of Standards and Technology

8:20 to 9:05 am: **Plenary Presentation: Airbus Airframe Innovation: The Future Role of Smart Structures**
Henrik Roesner, Airbus Structural Engineering

Session 6 runs concurrently with session 10.

SESSION 6

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

Damping I

Session Chairs: **Hyung-Jo Jung,** Korea Advanced Institute of Science and Technology (South Korea); **Heon-Jae Lee,** Korea Advanced Institute of Science and Technology (South Korea)

9:10 am: ****Crack detection methods for concrete and steel using radio frequency identification and electrically conductive materials**, Koichi Morita, Building Research Institute (Japan) . . . . . [6932-29]

9:30 am: **Colloidal dampers for semi-active isolation and suspension systems**, Gangyi Zhou, Univ. of California/Irvine; Bryan Johnson, Honda R&D Americas, Inc.; Lizhi Sun, Univ. of California/Irvine . . [6932-30]

9:50 am: **Integrated design method of MR damper and electromagnetic induction system for structural control**, Heon-Jae Lee, Hyung-Jo Jung, Korea Advanced Institute of Science and Technology (South Korea); Seok-Jun Moon, Korea Institute of Machinery & Materials (South Korea); Kang-Min Choi, Korea Advanced Institute of Science and Technology (South Korea) . . . . . [6932-31]

Coffee Break. . . . . 10:10 to 10:30 am

SESSION 10

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

Monitoring Systems

Session Chairs: **V. Sundararajan,** Univ. of California/Riverside; **David Ma,** Univ. of Hawai'i at Manoa

9:10 am: ****FEA model and theoretical analysis of a novel triaxial optical tactile sensing system**, Jiamin Liu, Yingjun Pan, Chongqing Univ. (China); Tianwei Ma, Univ. of Hawai'i at Manoa; Qi Yang, Chongqing Univ. (China) . . . . . [6932-48]

9:30 am: **Real-time damage detection using self-sensing E-glass composites**, Shoaib A. Malik, Gerard F. Fernando, David Collins, Liwei Wang, Venkata Machavaram, The Univ. of Birmingham (United Kingdom) . . . . . [6932-49]

9:50 am: **Sensor fusion for machine condition monitoring**, Xin Xue, V. Sundararajan, Univ. of California/Riverside . . . . . [6932-50]

Coffee Break. . . . . 10:10 to 10:35 am

SESSION 4

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

Sensor Systems for Monitoring in Wind Energy Applications

Session Chairs: **Jinsong Leng,** Harbin Institute of Technology (China); **Tom W. Graver,** Micron Optics, Inc.

9:10 am: **Structural health monitoring of wind turbine blades** *(Invited Paper)*, Mark A. Rumsey, Joshua Paquette, Sandia National Labs. . . [6933-14]

9:50 am: **Integrated monitoring of wind plant systems**, Matthew J. Whelan, Kerop D. Janoyan, Tong Qiu, Clarkson Univ. . . . . [6933-15]

Coffee Break. . . . . 10:10 to 10:35 am

SESSION 4

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

SHM for Aerospace Applications II

Session Chairs: **Victor Giurgiutiu,** Univ. of South Carolina; **Kumar V. Jata,** Air Force Research Lab.

9:10 am: **Damage diagnostics of metallic structures using magneto-mechanical impedance techique**, Andrei N. Zagrai, Hakan Cakan, New Mexico Institute of Mining and Technology [6935-18]

9:30 am: **Modeling of elastic wave scattering by a hole in a half-space using distributed point source method**, Samik Das, Sourav Banerjee, Tribikram Kundu, The Univ. of Arizona. . . . . [6935-19]

9:50 am: **Microcapacitive sensor for delamination monitoring**, Bohua Sun, Cape Peninsula Univ. of Technology (South Africa) . . . . . [6935-20]

Coffee Break. . . . . 10:10 to 10:35 am

SESSION 5

Sunset . . . . . Tues. 10:35 to 11:55 am

Hysteresis Control

Session Chair: **Xiang Fan,** North Carolina State Univ.

10:35 am: **Adaptive control of hysteresis in smart materials**, Xiang Fan, Ralph Smith, North Carolina State Univ. . . . . [6926-18]

10:55 am: **ANFIS-based modeling and inverse control of a thin SMA wire**, Atilla Kilicarslan, Gangbing Song, Karolos M. Grigoriadis, Univ. of Houston . . . . . [6926-19]

11:15 am: **Memory-based hysteresis compensation and nonlinear modeling of galfenol-driven micropositioning actuators**, Saeid Bashash, Kushan Vora, Nader Jalili, Clemson Univ.; Phillip G. Evans, Marcelo J. Dapino, The Ohio State Univ. . . . . [6926-20]

11:35 am: **Nonlinear adaptive control of dynamic systems driven by shape memory alloy (SMA) actuators**, Shuo Chen, William J. Craft, Yong D. Song, North Carolina A&T State Univ. . . . . [6926-21]

Lunch/Exhibition Break . . . . . 11:55 am to 1:30 pm

SESSION 4 continued

10:35 am: **Microdeposition method: a novel fabrication method for ionic polymer metallic composites**, David J. Griffiths, Vishnu B. Sundaresan, Virginia Polytechnic Institute and State Univ.; Barbar J. Akle, Lebanese American Univ. (Lebanon); Pavlos P. Vlachos, Donald J. Leo, Virginia Polytechnic Institute and State Univ. . . . . [6927-11]

10:55 am: **Bimetallically electroded ionic polymer-metal composite(s)**, Sang-Mun Kim, Kwang J. Kim, Univ. of Nevada/Reno . . . . . [6927-12]

11:15 am: **A new force field for molecular dynamics studies of Li- and Na-Nafion**, Endel Soolo, Tartu Ülikool (Estonia); Anti Liivat, Uppsala Univ. (Sweden) and Tartu Ülikool (Estonia); Daniel Brandell, Virginia Polytechnic Institute and State Univ.; Tarmo Tamm, Heiki Kasemägi, Alvo Aabloo, Tartu Ülikool (Estonia) . . . . . [6927-13]

11:35 am: **Modeling and control of an IPMC actuator,** Kam K. Leang, Yingfeng Shan, Virginia Commonwealth Univ. . . . . [6927-64]

11:55 am: **A distributed model of IPMC**, Andres Punning, Maarja Kruusmaa, Mart Anton, Urmas Johanson, Alvo Aabloo, Tartu Ülikool (Estonia) . . . . . [6927-15]

Lunch/Exhibition Break . . . . . 12:15 to 1:50 pm

Session 5 runs concurrently with session 9.

SESSION 5

Royal Palm V. . . Tues. 10:50 am to 12:30 pm

Automotive and Transportation Systems

Session Chairs: **Mehdi Ahmadian,** Virginia Polytechnic Institute and State Univ.

10:50 am: **Development of adaptive helicopter seat systems for aircrew vibration mitigation**, Yong Chen, Viresh Wickramasinghe, David G. Zimcik, National Research Council Canada (Canada) . . . . . [6928-23]

11:10 am: **Active constrained layer damping treatment of vibrating rotor blade for turbomachinary applications**, Nilanjan Mallik, Univ. of Cincinnati[6928-24]

11:30 am: **Application of orthogonal eigenstructure control in vehicles**, Mohammad A. Rastgaar, Mehdi Ahmadian, Steve C. Southward, Virginia Polytechnic Institute and State Univ. . . . . .[6928-25]

11:50 am: **Geometric optimization of controllable magnetorheological shock absorbers for commercial passenger vehicle**, Kum-Gil Sung, Young-Min Han, Seung-Bok Choi, Inha Univ. (South Korea) . . . .[6928-26]

12:10 pm: **Power harvesting for railroad track health monitoring using piezoelectric and inductive devices**, Carl A. Nelson, Stephen R. Platt, Vedvyas Kamarajugadda, David Albrecht, Univ. of Nebraska/Lincoln . . . .[6928-27]

Lunch Break . . . . . .12:30 to 1:30 pm

SESSION 9

Royal Palm VI . . Tues. 10:35 am to 12:35 pm

Modeling, Simulation, and Design of Controlled Systems I

Session Chair: **Steve C. Southward,** Virginia Polytechnic Institute and State Univ.

10:35 am: **Active optimal control of SSI system based on the finite element model of SSI system and shaking table test study**, Fengxia Wang, Jinping Ou, Harbin Institute of Technology (China). . . . . .[6928-41]

10:55 am: **Applicability of AMD controller based on the fixed-base structure to control SSI system**, Fengxia Wang, Jinping Ou, Harbin Institute of Technology (China) . . . . . .[6928-42]

11:15 am: **Controllable elastic couplings of a composite multilayered beam**, Alvord Marques, Farhan Gandhi, The Pennsylvania State Univ. . . . . .[6928-43]

11:35 am: **Piezo-shunt power-flow optimization for composite beam stabilization**, Manuel Collet, Univ. de Franche-Comté (France); Kenneth A. Cunefare, Benjamin S. Beck, Georgia Institute of Technology. . . . . .[6928-44]

11:55 am: **Two-step recursive fourth-order accuracy method for dynamic response computation based on principle of minimum transformed energy**, Dajun Li, Beijing Jiaotong Univ. (China); Tielin Liu, Shenyang Jianzhu Univ. (China) . . . . . .[6928-45]

12:15 pm: Vibration damping of aircraft wing structure using active constrained layer damping patches, Nilanjan Mallik, Univ. of Cincinnati. . . . . .[6928-46]

SESSION 5

California. . . . Tues. 10:35 am to 12:15 pm

Active Polymers

Session Chairs: **Siavouche Nemat-Nasser,** Univ. of California/San Diego; **Kam W. Leong,** Duke Univ.

10:35 am: **Magnetic and electric-field alignment of cellulose chains for electro-active paper actuator**, Jaehwan Kim, Sungryul Yun, Yi Chen, Sunkon Lee, Heung Soo Kim, Inha Univ. (South Korea) [6929-21]

10:55 am: **Rotational isomeric state theory applied to the stiffness prediction of an anion polymer electrolyte membrane**, Fei Gao, Lisa M. Weiland, Univ. of Pittsburgh . . . . . [6929-22]

11:15 am: **High-surface area electrodes in ionic polymer transducers: numerical and experimental investigations of the chemo-electric behavior**, Thomas Wallmersperger, Institut für Statik und Dynamik (Germany); Barbar J. Akle, Lebanese American Univ. (Lebanon); Etienne Akle, American Univ. of Beirut (Lebanon); Donald J. Leo, Virginia Polytechnic Institute and State Univ. . . . . [6929-23]

11:35 am: **Fabrication and characterization of piezo-paper made with cellulose**, Heung Soo Kim, Sungryul Yun, Jung-Hwan Kim, Gyu Young Yun, Jaehwan Kim, Inha Univ. (South Korea). . . [6929-24]

11:55 am: **Failure characteristics of bilayer lipid membranes formed over hydrophilic and hydrophobic substrates**, Miles A. Creasy, David P. Hopkinson, Donald J. Leo, Virginia Polytechnic Institute and State Univ. . . . . [6929-25]

Lunch/Exhibition Break . . . . . 12:15 to 1:30 pm

SESSION 5

Royal Palm III . . Tues. 10:35 am to 12:15 pm

Aerospace Applications

Session Chairs: **Brian P. Sanders,** Air Force Research Lab.; **W. Lance Richards,** NASA Dryden Flight Research Ctr.

10:35 am: **Design of piezoceramic-driven synthetic-jet actuator for aerodynamic performance improvement**, Razvan Rusovici, Florida Institute of Technology; Casey L. Offord, The Boeing Co.; Fumitaka Goto, Florida Institute of Technology; Adam Kearney, Piper Aircraft, Inc.; Michael D. Vergalla, Florida Institute of Technology. . . . . [6930-20]

10:55 am: **Development of a 1/4-scale NiTinol actuator for reconfigurable structures**, Robert T. Ruggeri, Richard C. Bussom, Darin J. Arbogast, The Boeing Co. . . . . [6930-21]

11:15 am: **Development of highly reliable advanced grid structure (HRAGS) demonstrator using FBG sensors**, Hajime Takeya, Kazushi Sekine, Masami Kume, Tsuyoshi Ozaki, Mitsubishi Electric Corp. (Japan); Nobuo Takeda, The Univ. of Tokyo (Japan); Naoyuki Tajima, R&D Institute of Metals and Composites for Future Industries (Japan) . [6930-22]

11:35 am: **Stability in hovering ornithopter flight**, John M. Dietl, Ephrahim Garcia, Cornell Univ. . . . . [6930-23]

11:55 am: **An analytical study of a novel flow vectoring airfoil via macro-fiber-composites**, Onur Bilgen, Kevin B. Kochersberger, Daniel J. Inman, Virginia Polytechnic Institute and State Univ.[6930-24]

Lunch/Exhibition Break . . . . . 12:15 to 1:30 pm

Sessions 7 runs concurrently with session 11.

SESSION 7

Royal Palm I . . . .Tues. 10:30 am to 12:30 pm

Damping II

Session Chair: **Heon-Jae Lee,** Korea Advanced Institute of Science and Technology (South Korea); **Hyung-Jo Jung,** Korea Advanced Institute of Science and Technology (South Korea)

10:30 am: **Large-scale smart passive system for civil engineering applications**, Hyung-Jo Jung, Heon-Jae Lee, Dong-Doo Jang, Korea Advanced Institute of Science and Technology (South Korea); Sang-Won Cho, Samsung Heavy Industries (South Korea) . . . . . [6932-32]

10:50 am: **Semi-active control of floor isolation system using MR damper**, Pei-Yang Lin, National Ctr. for Research on Earthquake Engineering (Taiwan); Chin-Hsiung Loh, National Taiwan Univ. (Taiwan) . . . . . [6932-33]

11:10 am: **Decentralized sliding mode control of building using MR-dampers**, Kung-Chun Lu, Chin-Hsiung Loh, National Taiwan Univ. (Taiwan); Jann N. Yang, Univ. of California/Irvine; Pei-Yang Lin, National Ctr. for Research on Earthquake Engineering. . . . . [6932-34]

11:30 am: **Performance evaluation of semi-active equipment isolation system using MR-dampers**, Yu-Cheng Fan, National Taiwan Univ. (Taiwan); Pei-Yang Lin, National Ctr. for Research on Earthquake Engineering (Taiwan); Chin-Hsiung Loh, National Taiwan Univ. (Taiwan); Jann N. Yang, Univ. of California/Irvine. . . . . [6932-35]

11:50 am: **Monitoring and evaluation of self-sensing concrete-filled FRP/FRP-steel composite tube columns under earthquake loading**, Xin Yan, Hui Li, Jinping Ou, Harbin Institute of Technology (China) . . . . . [6932-36]

12:10 pm: **Verification of real-time hybrid tests of response control of base isolation system by MR damper comparing shaking table tests**, Hideo Fujitani, Hiroaki Sakae, Rui Kaswasaki, Kobe Univ. (Japan); Hideki Fujii, Daiwa House Industry Co., LTD (Japan); Takeshi Hiwatashi, TOA Corp. (Japan) . . . . . [6932-161]

Lunch/Exhibition Break . . . . . 12:30 to 1:50 pm

SESSION 11

Royal Palm II. . . .Tues. 10:35 am to 12:35 pm

Ultrasonics for SHM

Session Chairs: **Henrique L. Reis,** Univ. of Illinois at Urbana-Champaign; **Irving J. Oppenheim,** Carnegie Mellon Univ.

10:35 am: ****Surface layer measurements of early age mortar investigated by ultrasonic guided waves and finite element analysis**, Henrique L. Reis, Jacob L. Borgerson, Univ. of Illinois at Urbana-Champaign. . . . . [6932-51]

10:55 am: ****Monotoring uniform and localized corrosion in reinforced mortar using high-frequency guided longitudinal wages**, Henrique L. Reis, Benjamin L. Ervin, Jennifer T. Bernhard, Daniel A. Kuchma, Univ. of Illinois at Urbana-Champaign. . . . . [6932-52]

11:15 am: **Impact detection using ultrasonic waves based on case-based reasoning**, Takehisa Otsuka, Akira Mita, Keio Univ. (Japan) . . . . . [6932-53]

11:35 am: ****Crack detection with wireless inductively-coupled transducers**, Peng Zheng, David W. Greve, Irving J. Oppenheim, Carnegie Mellon Univ. . . . . [6932-54]

11:55 am: ****Lamb waves and nearly longitudinal waves in thick plates**, David W. Greve, Irving J. Oppenheim, Peng Zheng, Carnegie Mellon Univ. . . . . [6932-55]

12:15 pm: **Noncontact local and global damage detection with integrated ultrasonic transducers**, Kuo-Ting Wu, McGill Univ. (Canada); Cheng-Kuei Jen, National Research Council Canada (Canada); Nezih Mrad, Defence Research and Development Canada (Canada) . . . . . [6932-56]

Lunch/Exhibition Break . . . . . 12:35 to 1:50 pm

SESSION 5

Royal Palm IV . . .Tues. 10:35 am to 12:15 pm

Fiber Optic Sensors in Energy

Session Chairs: **Brian Culshaw,** Univ. of Strathclyde (United Kingdom); **Kerop D. Janoyan,** Clarkson Univ.

10:35 am: **The rising demand for energy: a potential for optical fiber sensors in the monitoring sector** *(Invited Paper)*, Thomas Bosselmann, Michael Willsch, Siemens AG (Germany); Wolfgang Ecke, IPHT Jena (Germany). . . . . [6933-16]

11:15 am: **On-line structural health and fire monitoring of a composite personal aircraft using an FBG sensing system** *(Invited Paper)*, Keith Chandler, Chandler Monitoring Systems Inc.; Steve Ferguson, Tom W. Graver, Andrei Csipkes, Micron Optics, Inc.; Alexis Mendez, MCH Engineering LLC. . . . . [6933-17]

11:55 am: **Fiber Bragg grating sensor system for operational load monitoring of wind turbine blades**, Wolfgang Ecke, Kerstin Schroeder, Institut für Photonische Technologien e.V. (Germany). . . . . [6933-18]

Lunch/Exhibition Break . . . . . 12:15 to 1:30 pm

SESSION 5

Sunrise . . . . . Tues. 10:35 am to 12:15 pm

Nonlinear Methods for Damage Detection and SHM

Session Chairs: **Douglas E. Adams,** Purdue Univ.; **Michael D. Todd,** Univ. of California/San Diego

10:35 am: **Active ultrasonic joint integrity adjudication for real-time structural health monitoring**, Erik H. Clayton, Quartus Engineering Inc.; Matthew B. Kennel, Timothy R. Fasel, Michael D. Todd, Univ. of California/San Diego; Mark C. Stabb, Quartus Engineering Inc.; Brandon J. Arritt, Air Force Research Lab. . . . . [6935-21]

10:55 am: **Nonlinearity detection in multiple degree-of-freedom systems using the auto-bispectral density**, Jonathan M. Nichols, Naval Research Lab.; Pier Marzocca, Attilio Milanese, Clarkson Univ. . . . . [6935-22]

11:15 am: **Trispectrum analysis to detect cubic nonlinearities in structural systems**, Jonathan M. Nichols, Naval Research Lab.; Attilio Milanese, Pier Marzocca, Clarkson Univ. . . . . [6935-23]

11:35 am: **Implementation of nonlinear acoustic techniques for crack detection in a slender beam specimen**, Muhammad Haroon, Douglas E. Adams, Purdue Univ.. . . . . [6935-24]

11:55 am: **Damage detection in structures through nonlinear excitation and system identification**, Muhammad R. Hajj, Giancarlo G. Bordonaro, Ali H. Nayfeh, Bashar K. Hammad, John C. Duke, Jr., Virginia Polytechnic Institute and State Univ.[6935-25]

Lunch/Exhibition Break . . . . . 12:15 to 1:30 pm

SESSION 6

Sunset . . . . . Tues. 1:30 to 4:40 pm

Invited Session: Information Management for Structural Health Monitoring

Session Chairs: **Aditi Chattopadhyay,** Arizona State Univ.; **Antonia Papandreou-Suppappola,** Arizona State Univ.

1:30 pm: **Uncertainty representation and propagation in multiscale finite element simulations of local mechanical behavior in damaged metallic structures**, Arash Noshadravan, Univ. of Southern California; Andrea Keck, Rikki Teale, Arizona State Univ.; Roger G. Ghanem, Univ. of Southern California; Pedro Peralta, Arizona State Univ. . . . . [6926-22]

1:50 pm: **Stochastic crack growth modeling under spectrum loading for health monitoring and prognosis**, Christina J. Willhauck, Subhasish Mohanty, Aditi Chattopadhyay, Pedro Peralta, Arizona State Univ.. . . . . [6926-23]

2:10 pm: **Physics-based modeling for time-frequency damage classification**, Debejyo Chakraborty, Sunilkumar O. Soni, Jun Wei, Narayan Kovvali, Antonia Papandreou-Suppappola, Douglas Cochran, Aditi Chattopadhyay, Arizona State Univ. . [6926-24]

2:30 pm: **Sensor fusion and damage classification in composite structures**, Wenfan Zhou, Whitney D. Reynolds, Albert Moncada, Narayan Kovvali, Aditi Chattopadhyay, Antonia Papandreou-Suppappola, Douglas Cochran, Arizona State Univ.. . . . [6926-25]

2:50 pm: **Wave propagation and scattering from damage-induced defects and free edges**, Sunilkumar O. Soni, Jun Wei, Aditi Chattopadhyay, Pedro Peralta, Arizona State Univ.. . . . . [6926-26]

Coffee Break. . . . . 3:10 to 3:40 pm

3:40 pm: **Ultrasonic sensing and time-frequency analysis for detecting plastic deformation in an aluminum plate**, Lindsey Channels, Johns Hopkins Univ.; Narayan Kovvali, Arizona State Univ.; James Spicer, Johns Hopkins Univ.; Antonia Papandreou-Suppappola, Douglas Cochran, Pedro Peralta, Aditi Chattopadhyay, Arizona State Univ. . . . . [6926-27]

4:00 pm: **Damage detection in bolted joints using hierarchical SVMs**, Clyde K. Coelho, Narayan Kovvali, Antonia Papandreou-Suppappola, Aditi Chattopadhyay, Pedro Peralta, Arizona State Univ. . . . . [6926-28]

4:20 pm: Stochastic multiscale model for polycrystal material behavior, Roger G. Ghanem, Sonjoy Das, Arash Noshadravan, Univ. of Southern California . . . . . [6926-29]

SESSION 5

Golden West . . . . . Tues. 1:30 to 3:10 pm

IPMC II

Session Chairs: **Donald J. Leo,** Virginia Polytechnic Institute and State Univ.; **Silvain A. Michel,** EMPA (Switzerland)

1:30 pm: **Extensional ionic polymer conductor composite actuators with ionic liquids**, Sheng Liu, Minren Lin, Qiming Zhang, The Pennsylvania State Univ. . . . . [6927-93]

1:50 pm: **A scalable dynamic model for ionic polymer-metal composite actuators**, Zheng Chen, Xiaobo Tan, Michigan State Univ. . . . . [6927-17]

2:10 pm: **A correlation between extensional displacement and architecture of ionic polymer transducers**, Barbar J. Akle, Lebanese American Univ. (Lebanon); Andrew J. Duncan, Donald J. Leo, Virginia Polytechnic Institute and State Univ.[6927-18]

2:30 pm: **Frequency response of anisotropic ionic polymer metal composites (IPMC) transducers**, Boyko L. Stoimenov, 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); Kinji Asaka, National Institute of Advanced Industrial Science and Technology (Japan) . . . . . [6927-19]

2:50 pm: **An investigation on effect of IPMC thickness in actuation performance**, Didem Cilingir, Yusuf Z. Menceloglu, Melih Papila, Sabanci Univ. (Turkey). . . . . [6927-20]

Coffee Break. . . . . 3:10 to 3:40 pm

SESSION 6

Royal Palm V. . . . . Tues. 1:30 to 2:50 pm

SMAs Integrated Systems I

Session Chairs: **Mehdi Ahmadian,** Virginia Polytechnic Institute and State Univ.; **Mehrdad N. Ghasemi-Nejhad,** Univ. of Hawaii at Manoa;

1:30 pm: **A smart compliant mechanism made of SMA actuators utilizing shape memory and superelastic effects**, Muthuswamy Sreekumar, Nagarajan Thirumalaiswamy, Singaperumal Makaram, Indian Institute of Technology Madras (India) . . . . . [6928-28]

1:50 pm: **Multifunctional SMA-based smart inhaler system for improved aerosol drug delivery: design and fabrication**, Matthew E. Pausley, Stefan S. Seelecke, North Carolina State Univ. . . . . [6928-29]

2:10 pm: **Dynamics and control of buckling type devices using SMA wire integrated beam**, Debiprosad Roy Mahapatra, Indian Institute of Science (India) . . . . . [6928-30]

2:30 pm: **Chaotic and random vibrations of a SMA passive vibration isolation and damping device**, Dimitris C. Lagoudas, Luciano G. Machado, Texas A&M Univ.. . . . . [6928-31]

Coffee Break. . . . . 2:50 to 3:20 pm

SESSION 6

California. . . . . Tues. 1:30 to 3:10 pm

Active Composites I

Session Chairs: **Donald J. Leo,** Virginia Polytechnic Institute and State Univ.; **Lisa Mauck Weiland,** Univ. of Pittsburgh

1:30 pm: **Fatigue characteristics of carbon-nanotube blocks under compression**, Jonghwan Suhr, Univ. of Nevada/Reno. . . . . [6929-86]

1:50 pm: **Effective material properties of MWCNT-coated carbon-fiber composites**, Ryan J. Sager, Greg S. Payette, Dimitris C. Lagoudas, Texas A&M Univ. . . . . [6929-28]

2:10 pm: **Self-sensing and self-actuating CFRP structure using partially flexible composites**, Keisuke Kumagai, Akira Todoroki, Ryosuke Matsuzaki, Tokyo Institute of Technology (Japan) . . . . . [6929-29]

2:30 pm: **Calculation of electromagnetic material parameters for uniaxial bianisotripic composite materials through numerical simulation**, Alireza V. Amirkhizi, Siavouche Nemat-Nasser, Univ. of California/San Diego. . . . . [6929-90]

2:50 pm: **Electric field-assisted processing of nanocomposites: a route toward developing multifunctional polymers**, Sumanth Banda, Sanjay Kalidindi, Zoubeida Ounaies, Texas A&M Univ. . . . . [6929-91]

Coffee Break. . . . . 3:10 to 3:40 pm

SESSION 6

Royal Palm III . . . . . Tues. 1:30 to 3:10 pm

Future of SMA

Session Chairs: **David Ernest Havens,** Cornerstone Research Group, Inc.; **Christian Boller,** The Univ. of Sheffield (United Kingdom)

1:30 pm: **Development and test of an HTSMA supersonic inlet ramp actuator (future of SMA)**, Todd R. Quackenbush, Alexander Boschitsch, Pavel Danilov, Continuum Dynamics, Inc.; Bernie F. Carpenter, BBC Consultants . . . . . [6930-25]

1:50 pm: **Stabilizing shape-memory alloy actuator performance through cyclic shakedown: an empirical study**, Helen Sun, Jonathan E. Luntz, Anupam Pathak, Diann E. Brei, Univ. of Michigan; Paul W. Alexander, Nancy L. Johnson, General Motors Corp. . . . . [6930-26]

2:10 pm: **High-temperature shape-memory alloy actuators through mechanical treatments for an oil and gas down-hole valve**, Jonathan G. Gore, Lakshman Chandresekaran, Adrian R. Bowles, Mark G. Maylin, QinetiQ Ltd. (United Kingdom); David Forsyth, Mark Byers, Omega Completion Technology Ltd. (United Kingdom) . . . . . [6930-27]

2:30 pm: **Spray forming of NiTi and NiTiPd shape-memory alloys**, Ronald W. Smith, Materials Resources International; Robert T. Ruggeri, James H. Mabe, The Boeing Co.; Ronald D. Noebe, NASA Glenn Research Ctr.. . . . . [6930-28]

2:50 pm: **Variable area jet nozzle using shape-memory alloy actuators in an antagonistic design (future of SMA)**, James H. Mabe, Frederick T. Calkins, Mehmet B. Alkislar, The Boeing Co.[6930-29]

Coffee Break. . . . . 3:10 to 3:40 pm

Session 8 runs concurrently with session 12.

SESSION 8

Royal Palm I . . . . . Tues. 1:50 to 3:10 pm

Reconfigurable Systems

Session Chairs: **George Akhras,** Royal Military College of Canada (Canada); **Ser-Tong Quek,** National Univ. of Singapore (Singapore)

1:50 pm: **Shape memory polymer composite and its application in deployable hinge for space structure**, Yanju Liu, Xiaohua Wang, Haibao Lv, Jinsong Leng, Harbin Institute of Technology (China) . . . . . [6932-37]

2:10 pm: **Reflexive composites: self-healing composite structures**, Thomas W. Margraf, Jr., David E. Havens, Christopher D. Hemmelgarn, Cornerstone Research Group, Inc. . . . . [6932-39]

2:30 pm: **Self repairing composites for airplane components**, Carolyn M. Dry, Natural Process Design, Inc.. . . . . [6932-40]

2:50 pm: **Infrared laser-activated shape memory polymer**, Dawei Zhang, Yanju Liu, Jinsong Leng, Harbin Institute of Technology (China). . . . [6932-41]

Coffee Break. . . . . 3:10 to 3:40 pm

SESSION 12

Royal Palm II. . . . . Tues. 1:50 to 3:10 pm

Modeling and Design of Smart Systems I

Session Chairs: **Dryver R. Huston,** The Univ. of Vermont

1:50 pm: **Self sealing tanks and pressure vessels**, Dryver R. Huston, The Univ. of Vermont; Xiao-yan Sun, Jin-Yang Zheng, Zhejiang Univ. (China); Quan Qin, Tsinghua Univ. (China); Yong Chen, Zhejiang Univ. (China); Frederic Sansoz, The Univ. of Vermont . . . . . [6932-57]

2:10 pm: ****Mechanics of surface stress generation during SAM formation of alkanethiol**, Pranav Shrotriya, Kyung-Ho Kang, Iowa State Univ.[6932-58]

2:30 pm: **Use of spatiotemporal response information from sorption-based cross-reactive sensor arrays to identify and quantify the composition of analyte mixtures**, Marc D. Woodka, Nathan S. Lewis, California Institute of Technology. . . . . [6932-60]

2:50 pm: ****A large area multifunctional flexible stretchable network for smart structures**, Giulia Lanzara, Fu-Kuo Chang, Stanford Univ. . . [6932-61]

Coffee Break. . . . . 3:10 to 3:40 pm

SESSION 6

Royal Palm IV . . . . . Tues. 1:30 to 3:30 pm

Wireless Sensors for SHM

Session Chairs: **Eric Udd,** Columbia Gorge Research; **Mark A. Rumsey,** Sandia National Labs.

1:30 pm: **Wireless vibration monitoring for damage detection of highway bridges** *(Invited Paper)*, Matthew J. Whelan, Michael V. Gangone, Kerop D. Janoyan, Ratneshwar Jha, Clarkson Univ. [6933-19]

2:10 pm: **Demonstration of a roving-host wireless sensor network for rapid assessment monitoring of structural health**, David D. L.Mascarenas, Eric B. Flynn, Kaisen Lin, Univ. of California/San Diego; Kevin Farinholt, Los Alamos National Lab.; Rajesh K. Gupta, Univ. of California/San Diego; Gyuhae Park, Los Alamos National Lab.; Michael D. Todd, Univ. of California/San Diego; Charles R. Farrar, Los Alamos National Lab. . . . . [6933-20]

2:30 pm: **Field deployment of a dense wireless sensor network for condition assessment of a multispan bridge**, Michael V. Gangone, Matthew J. Whelan, Kerop D. Janoyan, Ratneshwar Jha, Clarkson Univ. . . . . [6933-21]

3:10 pm: **Technique issues for wireless structural health monitoring of bridges**, Jian Su, Research Institute of Highway (China) . . . . . [6933-22]

Coffee Break. . . . . 3:10 to 3:40 pm

SESSION 1

Royal Palm VI . . . . . Tues. 1:30 to 5:40 pm

NDE in Composite Materials and Aerospace Engineering

Session Chairs: **Lizhi Sun,** Univ. of California/Irvine; **Bernhard R. Tittmann,** The Pennsylvania State Univ.

1:30 pm: **Damage detection of laminated composite beams with progressive wavelet transform**, Maosen Cao, Pizhong Qiao, Washington State Univ. . . . . [6934-01]

1:50 pm: **Inspection of impact-induced shock waves in carbon fiber composites using shearographic interferometry**, Oliver Focke, Univ. Bremen (Germany) and Faserinstitut Bremen e.V. (Germany); Mircea Calomfirescu, Faserinstitut Bremen e.V. (Germany); Christoph von Kopylow, Univ. Bremen (Germany) . . . . . [6934-02]

2:10 pm: **Electrical resistance change method for delamination monitoring of CFRP plates: effect of plate scale**, Akira Todoroki, Nobuo Hirai, Ryosuke Matsuzaki, Tokyo Institute of Technology (Japan) . . . . . [6934-03]

2:30 pm: **Detecting damage in full-scale honeycomb sandwich composite fuselage panels through frequency response**, Frank A. Leone, Jr., Drexel Univ.; Didem Ozevin, Physical Acoustics Corp.; Bao Mosinyi, John G. Bakuckas, Jr., Curtis Davies, David Galella, Paul Swindell, Federal Aviation Administration; Jonathan Awerbuch, Alan Lau, Tein-Min Tan, Drexel Univ.. . . . . [6934-04]

2:50 pm: **Self-monitoring fiber-reinforced polymer strengthening system for civil engineering infrastructure**, Guoliang Jiang, Mina Dawood, Kara J. Peters, Sami H. Rizkalla, North Carolina State Univ. . . . . [6934-05]

Coffee Break. . . . . 3:10 to 3:40 pm

SESSION 6

Sunrise . . . . . Tues. 1:30 to 3:10 pm

Next-Generation Sensing and Algorithmic Technologies for SHM

Session Chairs: **Jerome Peter Lynch,** Univ. of Michigan; **Jennifer E. Michaels,** Georgia Institute of Technology

1:30 pm: **Monitoring forces in bridge steel cables using a wireless monitoring system**, Ying Lei, Xiamen Univ. (China) . . . . . [6935-26]

1:50 pm: **Wave propagation models for quantitative defect detection by ultrasonic methods**, Ankit Srivastava, Ivan Bartoli, Stefano Coccia, Francesco Lanza di Scalea, Univ. of California/San Diego. . . . . [6935-27]

2:10 pm: **Decentralized wireless structural sensing and control with multiple system architectures operating at multiple sampling frequencies**, Yang Wang, Georgia Institute of Technology; Raymond A. Swartz, Jerome P. Lynch, Univ. of Michigan; Amy C. Askin, Kincho H. Law, Stanford Univ.; Chin-Hsiung Loh, National Taiwan Univ. (Taiwan) . . . . . [6935-28]

2:30 pm: **Passive and active corrosion sensing for concrete reinforcing steel using GMR sensors**, John S. Popovics, Patrick L. Chapman, Gonzalo Gallo, Melanie Shelton, Univ. of Illinois at Urbana-Champaign. . . . . [6935-29]

2:50 pm: **Bio-inspired molecular photonic devices and nanodevices**, George C. Giakos, Univ. of Akron . . . . . [6935-30]

Coffee Break. . . . . 3:10 to 3:40 pm

SESSION 6

Golden West . . . . . Tues. 3:40 to 5:20 pm

Dielectric EAP Actuators I

Session Chairs: **Barbar J. Akle,** Lebanese American Univ. (Lebanon); **Geoffrey Maxwell Spinks,** Univ. of Wollongong (Australia)

3:40 pm: **Accomplishments and future trends in the field of electroactive polymers** *(Invited Paper)*, Aleksandra M. Vinogradov, Montana State Univ./Bozeman . . . . . [6927-21]

4:20 pm: **Polymer nanocomposites as electrostrictive and piezoelectric materials**, Sujay J. Deshmukh, Zoubeida Ounaies, Texas A&M Univ.; Ramanan Krishnamoorti, Univ. of Houston [6927-22]

4:40 pm: **Polyaniline nanofibers as electrode materials for dielectric elastomer**, Tuling M. Lam, Henry Tran, Wei Yuan, Zhibin Yu, Richard B. Kaner, Qibing Pei, Univ. of California/Los Angeles [6927-23]

5:00 pm: **Self-clearable carbon nanotube electrodes for improved performance of dielectric elastomer actuators,** Wei Yuan, Liangbing Hu, Soon Mok Ha, Tuling M. Lam, George Gruner, Qibing Pei, Univ. of California/Los Angeles . . . . . [6927-24]

SESSION 7

Royal Palm V. . . . . Tues. 3:20 to 4:40 pm

SMAs Integrated Systems II

Session Chairs: **Gregory Paul Carman,** Univ. of California/Los Angeles; **Diann E. Brei,** Univ. of Michigan

3:20 pm: **Experimental investigation and numerical evaluation of an innovative shape-memory alloy damper**, Wenjie Ren, Dalian Univ. of Technology (China) and Hebei Univ. of Technology (China); Hong-Nan Li, Dalian Univ. of Technology (China); Gangbing Song, Univ. of Houston . . . . . [6928-34]

3:40 pm: **Characterization of NiTiPdPt HTSMA springs and their potential applications in aeronautics (future of SMA)**, Aaron P. Stebner, Santo A. Padula II, Ronald D. Noebe, NASA Glenn Research Ctr.; D. D. Quinn, The Univ. of Akron . . . . . [6928-35]

4:00 pm: **Testing of SMA-enabled active chevron prototypes under representative flow conditions (future of SMA)**, Travis L. Turner, Randolph H. Cabell, Richard J. Silcox, NASA Langley Research Ctr. . . . . [6928-36]

4:20 pm: **Parameter identification of piezoelectric bimorphs for dynamic applications considering strain and velocity dependent effects,** Björn Richter, Jens Twiefel, Univ. Paderborn (Germany). . . . . [6928-37]

SESSION 7

California. . . . . Tues. 3:40 to 6:00 pm

Active Composites II

Session Chairs: **Jonghwan Suhr,** Univ. of Nevada/Reno; **Zoubeida Ounaies,** Texas A&M Univ.

3:40 pm: **Fatigue behavior of glass fiber-epoxy laminates with embedded SHM sensors**, Fabrizia Ghezzo, Siavouche Nemat-Nasser, Univ. of California/San Diego. . . . . [6929-31]

4:00 pm: **Mechanical damping and acoustic performance of multifunctional aluminium foam**, Joe McRae, Hani E. Naguib, Univ. of Toronto (Canada) . . . . . [6929-32]

4:20 pm: **Three-dimensional FEA simulation of segmented reinforcement variable stiffness composites**, Christopher P. Henry, Geoffrey P. McKnight, HRL Labs., LLC; Rob Bortolin, Shiv P. Joshi, Andrew Enke, NextGen Aeronautics, Inc. . . . . [6929-33]

4:40 pm: **Quantitative assessment of microcrack healing in polymer composites**, Siavouche Nemat-Nasser, Univ. of California/San Diego; Thomas A. Plaisted, Luna Innovations Inc. . . . . [6929-34]

5:00 pm: **Wave dispersion in cellular composite with modulated microstructure**, Vijay Kumar Chanda, Debiprosad Roy Mahapatra, Indian Institute of Science (India) . . . . . [6929-35]

5:20 pm: **Meso- and nano-scale techniques for self-healing wire and cable insulation**, Dryver R. Huston, Frederic Sansoz, Dylan Burns, The Univ. of Vermont; Bernie Tolmie, Tolmie Inc. . . . . [6929-36]

5:40 pm: **Piezoresistance property of cement-based composites filled with carbon black: theoretical model and experimental results,** Huigang Xiao, Hui Li, Harbin Institute of Technology (China); Jinping Ou, Harbin Institute of Technology (China) and Dalian Univ. of Technology (China) . . . . . [6929-37]

SESSION 7

Royal Palm III . . . . . Tues. 3:40 to 6:00 pm

Medical and Optical Applications

Session Chairs: **Steven Fulton Griffin,** Boeing-SVS, Inc.; **Kevin M. Farinholt,** Los Alamos National Lab.

3:40 pm: **New configurations of oscillatory flow pumps using bimorph piezoelectric actuators**, Sandro L. Vatanabe, Rogério F. Pires, INOVEO Automação de Sistemas (Brazil); Emílio C. N. Silva, Escola Politécnica da Univ. de São Paulo (Brazil). . . . . [6930-30]

4:00 pm: **Study of oscillatory piezoelectric flow pumps using bimorph actuators with different tip geometries**, Rogério F. Pires, Sandro L. Vatanabe, INOVEO Automação de Sistemas (Brazil); Emílio C. N. Silva, Escola Politécnica da Univ. de São Paulo (Brazil). . . . . [6930-31]

4:20 pm: **Experimental investigation of waveguide dynamics for the medical invasion treatment**, Algimantas Bubulis, Arvydas Palevicius, Vytautas Jurenas, Ramutis Bansevicius, Andrius Rinkevicius, Kaunas Univ. of Technology (Lithuania) . . . [6930-32]

4:40 pm: **Temperature-pressure characteristics of SMH actuator using a Peltier module**, Kyung Kim, Kyung-Ju Hong, Tae-Kyu Kwon, Dong-Wook Kim, Nam-Gyun Kim, Chonbuk National Univ. (South Korea) . . . . . [6930-33]

5:00 pm: **High-resolution interrogator system for fiber grating sensor**, Susan X. Dong, AT Photonics, Inc.; Tianshu Li, Ho Liu, Xianfeng Wei, Peng Ye, Guoming Xu, Daqing Oilfield Corp. (China); Fanyong Meng, AT Photonics, Inc.; Binghui Xu, Weidong Hao, Daqing Oilfield Corp. (China) . . . . . [6930-34]

5:20 pm: **A piezoelectric deformable mirror for intra-cavity laser adaptive optics**, Philip W. Loveday, Craig S. Long, Andrew Forbes, Council for Scientific and Industrial Research (South Africa) . . . . . [6930-35]

5:40 pm: **High-power piezoelectric acoustic-electric power feedthru for metal walls,** Xiaoqi Bao, Will Biederman, Stewart Sherrit, Mircea Badescu, Yoseph Bar-Cohen, Christopher M. Jones, Jack B. Aldrich, Zensheu Chang, Jet Propulsion Lab. . . . . [6930-36]

■ **Conference End** - *See page 30-31 for Poster listing.*

Session 9 runs concurrently with session 13.

SESSION 9

Royal Palm I . . . . . Tues. 3:40 to 6:00 pm

Wireless Sensors/Networks

Session Chairs: **Carolyn M. Dry,** Natural Process Design, Inc.; **Jeong-Tae Kim,** Pukyong National Univ. (South Korea)

3:40 pm: ****Improved reading techniques for electronic structural surveillance tags**, Praveenkumar Pasupathy, Dean P. Neikirk, Sharon L. Wood, The Univ. of Texas at Austin. . . . . [6932-42]

4:00 pm: **Development of smart sensor for hybrid health monitoring on PSC girders**, Jae-Hyung Park, Dong-Soo Hong, Jeong-Tae Kim, Pukyong National Univ. (South Korea); Michael D. Todd, David D. L.Mascarenas, Univ. of California/San Diego[6932-43]

4:20 pm: **Wireless inclinometer acquisition system for reducing swing movement control module experiment of hook model**, Yan Yu, Jinping Ou, Dalian Univ. of Technology (China); Chunwei Zhang, Harbin Institute of Technology (China). . . . [6932-44]

4:40 pm: **An embedded wireless system for remote monitoring of bridges**, Tyler J. Harms, Filippo Bastianini, Sahra Sedigh, Univ. of Missouri/ Rolla . . . . . [6932-45]

5:00 pm: **Damage detection for crane girder using wireless MEMS**, Swoo-Heon Lee, Kyung-Jae Shin, Whajung Kim, Hoe-Won Seo, Kyungpook National Univ. (South Korea) . . . . . [6932-46]

5:20 pm: ****Full-scale field evaluation of wireless MEMS monitoring system**, Hongjin Kim, Whajung Kim, Dae-Min Kim, Boung-Yong Kim, Kyungpook National Univ. (South Korea) . . . . . [6932-47]

5:40 pm: **Intelligent tires for improved tire safety using wireless strain measurement,** Ryosuke Matsuzaki, Akira Todoroki, Tokyo Institute of Technology (Japan) . . . . . [6932-03]

SESSION 13

Royal Palm II. . . . . Tues. 3:40 to 5:40 pm

Novel Sensors II

Session Chairs: **Myung-Keun Yoon,** South Dakota School of Mines and Technology; **Haiying Huang,** The Univ. of Texas at Arlington

3:40 pm: **Design of integrated IPMC/PVDF sensory actuator and its application to feedback control**, Zheng Chen, Ki-Yong Kwon, Xiaobo Tan, Michigan State Univ. . . . . [6932-04]

4:00 pm: ****Design and testing of a MEMS acoustic emission sensor system**, David W. Greve, Irving J. Oppenheim, Amelia P. Wright, Wei Wu, Carnegie Mellon Univ. . . . . [6932-63]

4:20 pm: ****Evaluation of a LPFG-based whitelight interferometric distance sensor for near-field surface profiling**, Haiying Huang, Ayan Majumdar, The Univ. of Texas at Arlington . . . . . [6932-64]

4:40 pm: **Time domain reflectometry as a distributed strain sensor**, Myung-Keun Yoon, Daniel F. Dolan, South Dakota School of Mines and Technology. . . . . [6932-65]

5:00 pm: **Design of an integrated piezoelectric wafer phased array for structural health monitoring**, Shivashankar Chenagani, Debiprosad Roy Mahapatra, Indian Institute of Science (India). . . . . [6932-66]

5:20 pm: **Usage of fiber Bragg grating sensors in low-earth orbit space environment,** Sang-Oh Park, Sang-Wuk Park, Chun-Gon Kim, Korea Advanced Institute of Science and Technology (South Korea). . . . . [6932-68]

SESSION 7

Royal Palm IV . . . . . Tues. 3:40 to 5:40 pm

Sensors for Structural Health Monitoring

Session Chairs: **Nobuo Takeda,** The Univ. of Tokyo (Japan); **Zhi Zhou,** Harbin Institute of Technology (China)

3:40 pm: **Structural health monitoring of composite and concrete structures by using fiber optic sensors** *(Invited Paper)*, Jinsong Leng, Harbin Institute of Technology (China). . . . . [6933-23]

4:20 pm: **Strain measurement during stress rupture of composite over-wrapped pressure vessel with fiber Bragg gratings sensors**, Curtis E. Banks, NASA Marshall Space Flight Ctr.; Joseph Grant, NASA Stennis Space Ctr.; Shawn Arnett, Texas Research International, Inc. . . . . [6933-24]

4:40 pm: **Research and development of 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 (Japan); Naoyuki Tajima, R&D Institute of Metals and Composites for Future Industries (Japan) . [6933-25]

5:00 pm: **Embedded distributed sensing network: integration considerations and findings**, Patrick M. Rye, Univ. of California/San Diego. . . . . [6933-26]

5:20 pm: **Chemical process monitoring and the detection of moisture ingress in composites,** Ramani S. Mahendran, Rongsheng Chen, Liwei Wang, Stephen N. Kukureka, Gerard F. Fernando, The Univ. of Birmingham (United Kingdom)[6933-28]

SESSION 1 Continued

3:40 pm: **Structural-health monitoring of composites using integrated ultrasonic transducers**, Makiko Kobayashi, National Research Council Canada (Canada); Kuo-Ting Wu, Li Song, McGill Univ. (Canada); Cheng-Kuei Jen, National Research Council Canada (Canada); Nezih Mrad, Ministry of National Defence (Canada). . . . [6934-06]

4:00 pm: **Dispersion of triboluminescent fillers for structural-health monitoring**, Tarik J. Dickens, Okenwa O. Okoli, Richard Liang, Florida State Univ. . . . . [6934-07]

4:20 pm: **Theoretical and experimental characteristics on residual stresses of advanced polymer composites**, Zhan-Sheng Guo, Shanghai Univ. (China) . . . . . [6934-08]

4:40 pm: **Robust fractal dimension-based damage identification of beam-type structures**, Pizhong Qiao, Maosen Cao, Washington State Univ.[6934-09]

5:00 pm: **Damage detection and leakage alert of fiber composite wrapped tank for high-pressure hydrogen storage**, Xiao-yan Sun, Zhejiang Univ. (China); Quan Qin, Tsinghua Univ. (China); Jin-Yang Zheng, Yong Chen, Zhejiang Univ. (China); Dryver R. Huston, Univ. of Vermont . . . . . [6934-10]

5:20 pm: **Vibration-based damage detection for filament wound pressure vessel filled with fluid**, Wensong Zhou, Zhanjun Wu, Hui Li, Harbin Institute of Technology (China). . . . . [6934-11]

SESSION 7

Sunrise . . . . . Tues. 3:40 to 6:00 pm

Signal Processing and NDE for SHM

Session Chairs: **Jennifer E. Michaels,** Georgia Institute of Technology; **Jerome Peter Lynch,** Univ. of Michigan

3:40 pm: **Health monitoring of plate structures using guided waves**, Paul Fromme, Univ. College London (United Kingdom) . . . . . [6935-31]

4:00 pm: **Defect characterization using ultrasonic arrays**, Paul D. Wilcox, Jie Zhang, Caroline Holmes, Bruce W. Drinkwater, Univ. of Bristol (United Kingdom) . . . . . [6935-32]

4:20 pm: **Experimental verification of a Kalman filter approach for estimating the size of fastener hole fatigue cracks**, Adam C. Cobb, Jennifer E. Michaels, Thomas E. Michaels, Georgia Institute of Technology. . . . . [6935-33]

4:40 pm: **Adaptive beamforming using ultrasonic arrays**, Alan J. Hunter, Paul D. Wilcox, Bruce W. Drinkwater, Univ. of Bristol (United Kingdom) . . . . . [6935-34]

5:00 pm: **Effectiveness of in-situ damage localization methods using sparse ultrasonic transducer arrays,** Jennifer E. Michaels, Georgia Institute of Technology. . . . . [6935-35]

5:20 pm: **A nonlinear acoustic technique for crack detection in metallic structures,** Debaditya Dutta, Carnegie Mellon Univ.; Hoon Sohn, Korea Advanced Institute of Science and Technology (South Korea); Kent A. Harries, Univ. of Pittsburgh . . . . . [6935-37]

5:40 pm: **Mapping some functions and four arithmetic operations to multilayer feedforward neural networks,** Jin-Song Pei, Eric C. Mai, Univ. of Oklahoma; Joseph P. Wright, Weidlinger Associates, Inc. . . . . [6935-83]

Posters - Tuesday

Poster presenters may set up between 10:00 am to 4:00 pm on Tuesday 11 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 12 March.

Conference 6926 - Posters

Optimization of monitoring parameters of a space tubular structure by using genetic algorithms, Jose dos Reis V. Moura, Jr., Valder Steffen, Jr., Univ. Federal de Uberlândia (Brazil); Daniel J. Inman, Virginia Polytechnic Institute and State Univ.[6926-31]

A new method to compress a bright object with line property in the high-resolution image, Lisheng Mu, Jinzong Li, Dongdong Li, Dongdong Ma, Harbin Institute of Technology (China). . . . . [6926-40]

Hybrid control and acquisition system for remote control systems for environmental monitoring, Fabio Garufi, Univ. degli Studi di Napoli Federico II (Italy); Fausto Acernese, Univ. degli Studi di Salerno (Italy); Alfonso Boiano, Istituto Nazionale di Fisica Nucleare (Italy); Rosario De Rosa, Gerardo Giordano, Univ. degli Studi di Napoli Federico II (Italy); Rocco Romano, Fabrizio Barone, Univ. degli Studi di Salerno (Italy). . . . . [6926-41]

Research of the control strategy of large aperture telescope based on fuzzy direct torque, Hu Wei, Nanjing Institute of Astronomical Optics & Technology (China). . . . . [6926-42]

Study of multirobot hybrid control architecture and task allocation, Leimin Li, Gang Liu, Southwest Univ. of Science and Technology (China) . [6926-45]

Vibration suppression of beam by using magnet-coil, Tai-Hong Cheng, Il-kwon Oh, Chonnam National Univ. (South Korea) . . . . . [6926-46]

Application of multisensor information fusion to the self-localization of mobile robot, Huang Yuqing, Chen Xiaoning, Southwest Univ. of Science and Technology (China) . . . . . [6926-47]

Conference 6927- Posters

Tunable transmission grating based on dielectric elastomer actuators, Manuel Aschwanden, David A. R.Niederer, Andreas Stemmer, ETH Zürich (Switzerland). . . . . [6927-56]

A cost-effective self-sensing dielectric actuator, Kwangmok Jung, Kwang J. Kim, Univ. of Nevada/Reno. . . . . [6927-66]

Frequency response of polypyrrole trilayer actuators: towards a better understanding of their dynamics, Stephen W. John, Gursel Alici, Christopher D. Cook, Univ. of Wollongong (Australia) . . . . . [6927-67]

Molecular dynamics studies of IPN-CP actuator material, Daniel Brandell, Virginia Polytechnic Institute and State Univ.; Heiki Kasemägi, Tartu Ülikool (Estonia); Frederic Vidal, Dominique Teyssié, Claude Chevrot, Univ. de Cergy-Pontoise (France); Alvo Aabloo, Tartu Ülikool (Estonia) . . . . . [6927-69]

A double-sided electret polymer film-based electrostatic actuator, Chih-Kung Lee, National Taiwan Univ. (Taiwan). . . . . [6927-72]

Electromechanical simulation of cellulose-based biomimetic electroactive actuator, Sangdong Jang, Jaehwan Kim, Inha Univ. (South Korea); Prathap Basappa, Norfolk State Univ.. . . . . [6927-73]

Novel electroactive polymer actuator based on ionic networking membrane of poly (styrene-alt-maleic anhydride)-incorporated poly (vinylidene fluoride), Jun Lu, Chonnam National Univ. (South Korea); Sang-Gyun Kim, Korea Research Institute of Chemical Technology (South Korea); Sunwoo Lee, Il-Kwon Oh, Chonnam National Univ. (South Korea). . . . . [6927-74]

Self healing properties of Cu-Pt coated ionic polymer actuators, Urmas Johanson, Andres Punning, Maarja Kruusmaa, Alvo Aabloo, Tartu Ülikool (Estonia) . . . . . [6927-75]

A multilink manipulator with IPMC joints, Andres Hunt, Andres Punning, Mart Anton, Alvo Aabloo, Maarja Kruusmaa, Tartu Ülikool (Estonia) . [6927-76]

ECMD behaviour of free-standing PEDOT films in organic and aqueous electrolytes, Jadranka Travas-Sejdic, Rudolf Kiefer, Paul A. Kilmartin, Graham A. Bowmaker, Ralph P. Cooney, The Univ. of Auckland (New Zealand). . . . . [6927-77]

The sensor response of polypyrrole trilayer benders as a function of geometry, Stephen W. John, Gursel Alici, Geoffrey M. Spinks, Univ. of Wollongong (Australia) . . . . . [6927-79]

High-precision characterization of dielectric elastomer stack actuators and their material parameters, Marc Matysek, Peter Lotz, Klaus P. Flittner, Helmut F. Schlaak, Technische Univ. Darmstadt (Germany). . . . . [6927-80]

Dielectric elastomer actuators using improved thin film processing and nanosized particles, Peter Lotz, Marc Matysek, Pia Lechner, Monika Hamann, Helmut F. Schlaak, Technische Univ. Darmstadt (Germany). . . . . [6927-81]

Frequency response characteristics of IPMC sensors with current/voltage measurements, Kentaro Takagi, Nagoya Univ. (Japan) and The Institute of Physical and Chemical Research (RIKEN) (Japan); Norihiro Kamamichi, Tokyo Denki Univ. (Japan) and The Institute of Physical and Chemical Research (RIKEN) (Japan); Boyko L. Stoimenov, The Institute of Physical and Chemical Research (RIKEN) (Japan); Kinji Asaka, National Institute of Advanced Industrial Science and Technology (Japan) and The Institute of Physical and Chemical Research (RIKEN) (Japan); Toshiharu Mukai, The Institute of Physical and Chemical Research (RIKEN) (Japan); Zhi-Wei Luo, Kobe Univ. (Japan) and The Institute of Physical and Chemical Research (RIKEN) (Japan). . [6927-82]

Preisach modeling of IPMC-EMIM actuator, Chul-Jin Kim, HyunWoo Hwang, No Cheol Park, Hyunseok Yang, Young-Pil Park, Yonsei Univ. (South Korea); Kang-Ho Park, Hyung-Kun Lee, Nak-Jin Choi, Electronics and Telecommunications Research Institute (South Korea) . . . . . [6927-83]

Preisach modeling of dielectric elastomer EAP actuator, HyunWoo Hwang, Chul-Jin Kim, Sung Joo Kim, Hyunseok Yang, No Cheol Park, Young-Pil Park, Yonsei Univ. (South Korea). . . . . [6927-84]

Porous conductive polyblends of polyaniline in poly(methyl methacrylate), Aaron D. Price, Hani E. Naguib, Univ. of Toronto (Canada). . . . . [6927-85]

Classification and selection of actuator technologies with consideration of stimuli generation, Alan Poole, Julian D. Booker, Univ. of Bristol (United Kingdom) . . . . . [6927-86]

Electric field sensitive poly(p-phenylene vinylene)/polydimethylsiloxane gel, Sumonman Niamlang, Anuvat Sirivat, Chulalongkorn Univ. (Thailand) . . . . . [6927-87]

The electric field around a dielectric elastomer actuator in proximity to the human body, Anita C. McKenzie, The Univ. of Auckland (New Zealand); Emilio P. Calius, Industrial Research Ltd. (New Zealand); Iain A. Anderson, The Univ. of Auckland (New Zealand). . . . . [6927-88]

Microwave-powered ionic polymer-metal composite actuators, Joon-Soo Lee, Woosoon Yim, Univ. of Nevada/Las Vegas; Kwang J. Kim, Univ. of Nevada/Reno . . . . . [6927-89]

Improved electromechanical response in interpenetrating networks of dielectric elastomers, Soon Mok Ha, Univ. of California/Los Angeles; Il-Seok Park, Univ. of Nevada/Reno; Ron Pelrine, SRI International; Kwang J. Kim, Univ. of Nevada/Reno; Qibing Pei, Univ. of California/Los Angeles. . . . . [6927-90]

Architecture for the semi-automatic assembly of thin-film modular units of dielectric elastomer in a compact macroscopic actuator, Marco Randazzo, Istituto Italiano de Tecnologia (Italy); Renato Buzio, Nanomed Labs. (Italy); Ugo Valbusa, Univ. degli Studi di Genova (Italy) . . . . . [6927-92]

Conference 6928 - Posters

BATMAV: a biologically-inspired micro-air vehicle for flapping flight: kinematics and actuation, Gheorghe Bunget, Stefan S. Seelecke, North Carolina State Univ. . . . . [6928-58]

Analysis of the dynamics of the vibratory tabular valve, Kazimieras Ragulskis, Vytenis Naginevicius, Minvydas Ragulskis, Arvydas Palevicius, Kauno Technologijos Univ. (Lithuania). . . . . [6928-102]

Analysis dynamics of piezoelectric optical scanner with periodical microstructure, Arvydas Palevicius, Giedrius Janusas, Vytautas Ostasevicius, Ramutis Bansevicius, Alfredas Busilas, Kauno Technologijos Univ. (Lithuania) . . . . . [6928-103]

Limit of feedback gains of collocated sensor and actuator pairs for beams, Young-Sup Lee, Univ. of Incheon (South Korea) . . . . . [6928-104]

A new optimal vibration control system for two connection structures, Jianlin Zhang, Xiamen Univ. (China) . . . . . [6928-105]

Flexible multisensors for robotics, Marco Santoro, ENEA (Italy). . . . . [6928-106]

Design and evaluation of a passive damper by using pseudoelasticity NiTi wires, Qiang Pan, Chongdu Cho, Inha Univ. (South Korea) . [6928-107]

Experimental evaluation of a flapping-wing aerodynamic model for MAV applications, Jun-Seong Lee, Dae-Kwan Kim, Jin-Young Lee, Jae-Hung Han, Korea Advanced Institute of Science and Technology (South Korea) . . . . . [6928-108]

Experimental and analytical investigation on innovative compound shape memory alloys dampers for structure control, Hui Qian, Hong-Nan Li, Dalian Univ. of Technology (China) . . . [6928-109]

Self optimizing piezoelectric damper, Adrian R. Bowles, Richard C. McBride, Matthew Greaves, Timothy Jarman, Jonathan G. Gore, QinetiQ Ltd. (United Kingdom) . . . . . [6928-110]

Design and Characterisation of Micro-Diaphragm for Low Power Drug Delivery Applications, Don W. Dissanayake, The Univ. of Adelaide (Australia) . . . . . [6928-112]

Conference 6829 - Posters

Nanofillers for property enhancement of polymer composites, Rahul R. Harshe, Amol M. Ridhore, Makarand G. Joshi, Research and Development Establishment (Engineering) (India) . . . . . [6929-30]

A thermo-magneto-mechanical free energy model for NiMnGa single-crystal thin films, Phillip Morrison, Stefan S. Seelecke, North Carolina State Univ.; Berthold Krevet, Manfred Kohl, Forschungszentrum Karlsruhe GmbH (Germany). . . . . [6929-59]

Effects of electric field and poling on the response of multilayer piezoelectric film actuators with partial electrodes, Yasuhide Shindo, Fumio Narita, Mitsuru Hirama, Tohoku Univ. (Japan). . . . . [6929-77]

The electrorheological responses and dielectropholysis force of elastomers at various temperatures, Ruksapong Kunanuruksapong, Anuvat Sirivat, Chulalongkorn Univ. (Thailand) . . . . . [6929-78]

Characterization of piezoelectric materials at high-stress levels using electrical impedance analysis, Adrian R. Bowles, Jonathan G. Gore, QinetiQ Ltd. (United Kingdom) . . . . . [6929-79]

Poly(ethylene oxide)- poly(ethylene glycol) blended cellulose electroactive paper, Jaehwan Kim, Suresha K. Mahadeva, Jyoti Nayak, Inha Univ. (South Korea) . . . . . [6929-80]

Research on natural characteristics of magnetostrictive actuators, Yong Yang, Beihang Univ. (China) . . . . . [6929-81]

Characterization of the actuator behavior of blended-system ferrogels, Geunhyung E. Park, LeAnn E. Faidley, The Univ. of Iowa. . . . . [6929-82]

Coupled electromechanical behavior of an interface electrode in a piezoelectric layer, Bao-Lin Wang, Yiu-Wing Mai, The Univ. of Sydney (Australia) . . . . . [6929-83]

Effect of electric field on effective electromechanical properties of two-phase piezoelectric composites, Nilanjan Mallik, Univ. of Cincinnati . . . . . [6929-84]

Mechanics of interface deformable magneto-electro-elastic layered structures, Fangliang Chen, Hohai Univ. (China); Pizhong Qiao, Washington State Univ. and Hohai Univ. (China). . . . . [6929-85]

Fabrication and electromagnetic characteristics of microwave absorbers containing carbon nanofibers and magnetic metals, Ki-Yeon Park, Korea Advanced Institute of Science and Technology (South Korea); Sang-Bok Lee, Jin-Bong Kim, Jin-Woo Yi, Sang-Kwan Lee, Korea Institute of Materials Science (South Korea); Jae-Hung Han, Korea Advanced Institute of Science and Technology (South Korea) . . . [6929-87]

Posters - Tuesday

Poster presenters may set up between 10:00 am to 4:00 pm on Tuesday 11 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 12 March.

Sensing properties and their applications of carbon fiber and hybrid-fiber reinforced-polymer bars as strain sensors, Xinyue Zhang, China Highway Planning and Design Institute Consultants, Inc. (China); Jinping Ou, Harbin Institute of Technology (China) and Dalian Univ. of Technology (China); B. Wang, Jilin Architectural and Civil Engineering Institute (China). . . . . [6929-88]

Characterization of material parameters in the constitutive model for chemomechanical actuation using ion co-transport, Vishnu B. Sundaresan, Donald J. Leo, Virginia Polytechnic Institute and State Univ.. . . . . [6929-89]

Transient response of three-phase magneto-electro-elastic beam using finite elements, Atul Daga, N. Ganesan, K. Shankar, Indian Institute of Technology Madras (India) . . . . . [6929-92]

Giant magnetoimpedance in Fe(Co)Ni/amorphous microwire multilayered composite and its application, Anh-Tuan Le, Chungbuk National Univ. (South Korea); Manh-Huong Phan, Univ. of Bristol (United Kingdom); Nguyen Quang Hoa, Chungbuk National Univ. (South Korea); Heebok Lee, Kongju National Univ. (South Korea); Seong-Cho Yu, Chungbuk National Univ. (South Korea). . . [6929-94]

Structural dielectrics for multifunctional capacitors, D. M. Baechle, Daniel O'Brien, Eric D. Wetzel, Army Research Lab. . . . . [6929-99]

Carbon nanotube epoxy modified CFRPs toward improved mechanical and sensing properties for multifunctional aerostructures, V. Kostopoulos, A. Vavouliotis, P. Karappapas, Univ. of Patras (Greece) . . . . . [6929-100]

Electrospinning of Continuous Piezoelectric Yarns For Composite Application, Zoubeida Ounaies, Natasha Lagoudas, Texas A&M Univ. . . . [6929-101]

Conference 6930 - Posters

Design, development, and testing of a transonic missile fin employing PBP/DEAS actuators, Ronald M. Barrett, Roelof Vos, The Univ. of Kansas; Roeland De Breuker, Technische Univ. Delft (Netherlands) . . . . . [6930-37]

The application of thermally induced multistable composites to morphing aircraft structures, Filippo Mattioni, Paul M. Weaver, Kevin D. Potter, Michael I. Friswell, Univ. of Bristol (United Kingdom) [6930-38]

A comparative study of ultrasonic micro-motors based on single-crystal PMN-PT and polycrystalline PZT ceramics, Stephen A. Wilson, Philip Rayner, Cranfield Univ. (United Kingdom); Richard C. McBride, Jonathan G. Gore, Adrian R. Bowles, QinetiQ Ltd. (United Kingdom); Nick C. Jones, The Univ. of Exeter (United Kingdom)[6930-39]

Design and evaluation of bimorph and sandwich tunable frequency power harvesting devices, Wen-Jong Wu, Yu-yih Chen, National Taiwan Univ. (Taiwan); Chia-Shun Lai, Yuh-Shyong Chu, Chen-Kai Hsu, Industrial Technology Research Institute (Taiwan) . . . . . [6930-40]

Quantifying the performance of piezoelectric optical switches, Michael Leung, Enrico Haemmerle, Jianling Yue, Khairunisak A. Razak, Michael A. Hodgson, Wei Gao, The Univ. of Auckland (New Zealand) . . . . . [6930-41]

Realization and Testing of an Active System for Structure-Borne Noise Control within a Car Chassis, Holger Hanselka, Martin Thomaier, Tobias Melz, Fraunhofer-Institut für Betriebsfestigkeit und Systemzuverlässigkeit (Germany) . . . . . [6930-42]

Adaptive structures for manipulation in clean room, Cristian Lira, F. Scarpal, Univ. of Bristol (United Kingdom) . . . . . [6930-43]

Conference 6931 - Posters

Study of a low-frequency vibration-to-electricity energy harvester, Min Zhang, Kun Lian, Pratul K. Ajmera, Louisiana State Univ. . . . . [6931-24]

Controlled release of salicylic acid from polyacrylamide hydrogel by electric field stimulation, Anuvat Sirivat, Sumonman Niamlang, Chulalongkorn Univ. (Thailand) . . . . . [6931-25]

Nanocrystalline NiZn ferrite for bio-medical applications, Sangeeta Thakur, S. C. Katyal, Jaypee Univ. of Information Technology (India); Mahavir Singh, Himachal Pradesh Univ. (India) . . . . [6931-26]

Conference 6932 - Posters

A damage classification technique for impedance-based health monitoring of helicopter blades, Jose dos Reis V. Moura, Jr., Valder Steffen, Jr., Univ. Federal de Uberlândia (Brazil); Daniel J. Inman, Virginia Polytechnic Institute and State Univ. . . . . [6932-129]

Adaptive optics system prototype for the automatic control of geometrical fluctuations in a laser beam in air, Salvatore Grasso, Univ. degli Studi Roma Tre (Italy); Fausto Acernese, Rocco Romano, Fabrizio Barone, Univ. degli Studi di Salerno (Italy) . . . . . [6932-142]

Long period grating-based ocean PH sensor in a SMS fiber, Ke Wang, Denis Klimov, Zbigniew Kolber, Monterey Bay Aquarium Research Institute[6932-144]

Damage detection of structures by acoustic emission technique, Yu Song, Ying Lei, Shu-Lin Li, Xiamen Univ. (China) . . . . . [6932-145]

A sensitivity-based method for sensor placement optimization of bridges, Song Yu, Ying Lei, Hai Jin, Xiamen Univ. (China) . . . . . [6932-146]

A distributed damage detection strategy employing smart sensor technology, Woo Sang Lee, Kitae Park, Bong Chul Joo, Yoonkoog Hwang, Korea Institute of Construction Technology (South Korea) . . . . . [6932-147]

Sensing rich drive trains for modern mechatronic systems: second year progress report, Masayoshi Tomizuka, Haifei Cheng, Chun-Chih Wang, Univ. of California/Berkeley . . . . . [6932-148]

Optical fiber grating-based sensing system for use in pavement health monitoring, Jian-Neng Wang, National Yunlin Univ. of Science and Technology (Taiwan); Jaw-Luen Tang, National Chung Cheng Univ. (Taiwan) . . . . . [6932-150]

Experimental study on the method of bridge safety evaluation by fiber Bragg grating optical sensor, Bong Chul Joo, Kitae Park, Woo Sang Lee, Yoonkoog Hwang, Korea Institute of Construction Technology (South Korea) . . . . . [6932-151]

Communication network-based strategy to establish the smart bridge safety management system, Woo Sang Lee, Kitae Park, Bong Chul Joo, Yoonkoog Hwang, Korea Institute of Construction Technology (South Korea) . . . . . [6932-152]

Conference 6933 - Posters

Landslide monitoring using a road-embedded optical fiber sensor, Michael R. Iten, Andreas Schmid, Alexander M. Puzrin, ETH Zürich (Switzerland) . . . . . [6933-44]

Health monitoring for subway station structure by fiber Bragg grating sensors, Yao Zhou, Beijing Jiaotong Univ. (China) and Harbin Institute of Technology (China). . . . . [6933-45]

A novel multifunctional optical fiber sensor based on FBG and fiber optic couple, Tao Fu, Sr., Harbin Institute of Technology (China); Chang Wang, Tongyu Liu, Shandong Academy of Sciences (China); Jinsong Leng, Harbin Institute of Technology (China)[6933-46]

Photonic crystal fiber long-period gratings for structural monitoring and chemical sensing, Jaw-Luen Tang, National Chung Cheng Univ. (Taiwan); Jian-Neng Wang, National Yunlin Univ. of Science and Technology (Taiwan) . . . . . [6933-47]

Development and application of 3D foot-shape measurement system under different loads, Liu Guozhong, Beijing Institute of Machinery (China); Wang Boxiong, Shi Hui, Luo Xiuzhi, Tsinghua Univ. (China) . . . . . [6933-48]

Mobile Bluetooth sensor node based on embedded arm-linux, Huang Yuqing, Xinqiang Liu, Jr., Southwest Univ. of Science and Technology (China) . . . . . [6933-49]

Comparison of the piezoelectric MEMS generators with interdigital electrodes and laminated electrodes, Wen-Jong Wu, Bor-Shiun Lee, National Taiwan Univ. (Taiwan) . . . . . [6933-50]

Conference 6935 - Posters

A new method for SAR measurement in MRI, Rocco Romano, Fausto Acernese, Univ. degli Studi di Salerno (Italy); Pietro L. Indovina, Univ. degli Studi di Napoli Federico II (Italy); Fabrizio Barone, Univ. degli Studi di Salerno (Italy). . . . . [6935-78]

Research on human physiological parameters intelligent clothing based on distributed fiber Bragg grating, Changyun Miao, Boya Shi, Hongqiang Li, Tianjin Polytechnic Univ. (China) . . . . . [6935-79]

Thin foils as acoustic windows and substrates for scanning acoustic microscopy: applications in live cell imaging, Moritz von Buttlar, Evgeny Twerdowski, Horst Voigt, Reinhold Wannemacher, Wolfgang Grill, Univ. Leipzig (Germany) . . . . . [6935-80]

Ultrasonic characterization of interfaces at Brewster angle reflection, James A. Sotiropoulos, Univ. of Crete (Greece). . . . . [6935-84]

Uniform circular array for structural health monitoring of composite structures, Tadeusz Stepinski, Marcus Engholm, Uppsala Univ. (Sweden). . . . . [6935-85]

Remote personal health monitoring with radio waves, Andrew Nguyen, Univ. of California/Irvine. . . . . [6935-86]

NSF Posters

Large-deformation polymer optical fiber sensors for civil infrastructure systems, Omid Abdi, Sharon Kiesel, Kara J. Peters, Mervyn Kowalsky, Tasnim Hassan, North Carolina State Univ. . . . . [6932-154]

Reliable data transmission of rotating wireless sensors using automatic repeat request, Lei Tang, Jobin Jacob, Kuang-Ching Wang, Yong Huang, Clemson Univ.; Fangming Gu, General Motors Corp. . . . . [6932-155]

Design of a prototype laminated sheet galfenol actuator, Andrew Passell, Supratik Datta, Suok-Min Na, Alison B. Flatau, Univ. of Maryland/College Park . . . . . [6932-156]

Granular segregation studies for retroreflector sensor development, Kimberly M. Hill, Univ. of Minnesota; Jennifer T. Bernhard, Univ. of Illinois at Urbana-Champaign; Susan C. Hagness, Univ. of Wisconsin/Madison; Fan Yi, Univ. of Minnesota. . . . . [6932-157]

Imagery surveillance for detection of improvised explosive devices (Presentation Only), A. Manohar, Univ. of California, San Diego; G. Vitale, Consultant (Italy); I. Bartoli, F. Lanza di Scalea, Univ. of California/San Diego . . . . . .[6932-163]

Golden West Room

8:00 to 8:05 am: **Announcements and Awards**

8:05 to 8:20 am: **Funding Agency-IVHM Program**
Ashok N. Srivastava, NASA Ames Research Ctr.

8:20 to 9:05 am: **Plenary Presentation: Implementing Smart Structures Technology in High-Consequence Applications**
Charles Farrar, Los Alamos National Lab.

SESSION 7

Sunset . . . . . Wed. 9:10 to 9:50 am

Optimization and Health Monitoring

Session Chair: **Cristovao M. Mota Soares,** Instituto Superior Técnico (Portugal)

9:10 am: **Optimization of location and number of sensors for structural health monitoring using genetic algorithm**, Giridhar S. Naorem, Makarand G. Joshi, Research and Development Establishment (Engineering) (India) . . . . . [6926-30]

9:30 am: **Optimal design of active, passive, and hybrid sandwich structures**, Cristovao M. Mota Soares, Instituto Superior Técnico (Portugal); Aurelio L. Araújo, Institute Politecnico de Braganca (Portugal); José Herskovits, Univ. Federal do Rio de Janeiro (Brazil) . . . . . [6926-32]

Coffee Break. . . . . 9:50 to 10:20 am

SESSION 7

Golden West . . . Wed. 9:10 am to 12:30 pm

Dielectric EAP Actuators II

Session Chairs: **Aleksandra M. Vinogradov,** Montana State Univ./ Bozeman; **Gabor M. Kovacs,** EMPA (Hungary)

9:10 am: **From dielectric elastomers to cellular ferroelectrets: soft matter as electroactive transducer materials** *(Invited Paper)*, Reinhard Schwödiauer, Ingrid Graz, Simona Bauer-Gogonea, Siegfried Bauer, Johannes Kepler Univ. Linz (Austria). . . . . [6927-25]

9:50 am: **A dielectric electroactive polymer generator-actuator model for dynamic simulation**, Curtis M. Ihlefeld, NASA Kennedy Space Ctr.; Zhihua Qu, Univ. of Central Florida . . . . . [6927-26]

Coffee Break. . . . . 10:10 to 10:30 am

SESSION 10

Royal Palm V. . . . . Wed. 9:30 to 10:10 am

Smart Materials and Structures Optimization II

Session Chair: **Daniel J. Inman,** Virginia Polytechnic Institute and State Univ.

9:30 am: **Sensitivity enhancement for damage detection in linear systems using optimal feedback auxiliary signals and system augmentation**, Kiran X. D'Souza, Bogdan I. Epureanu, Univ. of Michigan . . . . . [6928-47]

9:50 am: **Sensitivity-based performance evaluation and reliability assessment of adaptive systems**, Kai Wolf, Soong-Oh Han, Technische Univ. Darmstadt (Germany); Holger Hanselka, Fraunhofer-Institut für Betriebsfestigkeit und Systemzuverlässigkeit (Germany) . . . . . [6928-49]

Coffee Break. . . . . 10:10 to 10:35 am

SESSION 8

California. . . . . Wed. 9:10 to 10:10 am

Future of SMA I

Session Chairs: **Frederick Tad Calkins,** The Boeing Co.; **James H. Mabe,** The Boeing Co.

9:10 am: **Development of test procedures for thermomechanical characterization of a shape-memory alloy for high-force actuator applications and their use in characterizing a 55NiTi alloy**, Santo A. Padula II, NASA Glenn Research Ctr.; Darrell J. Gaydosh, Ohio Aerospace Institute; Glen S. Bigelow, Ronald D. Noebe, NASA Glenn Research Ctr.; Dimitris C. Lagoudas, Ibrahim Karaman, Texas A&M Univ.. . . . . [6929-38]

9:30 am: **Experimentally validated numerical analysis of aerostructures incorporating shape-memory alloys**, Darren J. Hartl, Jesse Mooney, Dimitris C. Lagoudas, Texas A&M Univ.; Frederick T. Calkins, James Mabe, The Boeing Co. . . . [6929-39]

9:50 am: **Pseudoelastic low-cycle fatigue response of ultrafine grained TiNb shape-memory alloys**, Ji Ma, Ibrahim Karaman, Texas A&M Univ. . . [6929-40]

Coffee Break. . . . . 10:10 to 10:35 am

Golden West Room

8:00 to 8:05 am: **Announcements and Awards**

8:05 to 8:20 am: **Funding Agency-IVHM Program**
Ashok N. Srivastava, NASA Ames Research Ctr.

8:20 to 9:05 am: **Plenary Presentation: Implementing Smart Structures Technology in High-Consequence Applications**
Charles Farrar, Los Alamos National Lab.

Session 14 runs concurrently with session 18.

SESSION 14

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

Damage Assessment: Wave Methods

Session Chairs: **Chung-Bang Yun,** Korea Advanced Institute of Science and Technology (South Korea); **Chih-Chen Chang,** Hong Kong Univ. of Science and Technology (Hong Kong China)

9:10 am: ****The effect of through-the-thickness holes on a reference-free damage diagnosis technique**, Chang Gil Lee, Hoon Sohn, Korea Advanced Institute of Science and Technology (South Korea) . . . . . [6932-69]

9:30 am: **Nondestructive estimation of crack depth in concrete**, Jiyoung Min, Korea Advanced Institute of Science and Technology (South Korea); Sung Woo Shin, Univ. of Illinois at Urbana-Champaign; Chung-Bang Yun, Korea Advanced Institute of Science and Technology (South Korea); Jinying Zhu, The Univ. of Texas at Austin; John S. Popovics, Univ. of Illinois at Urbana-Champaign . . . . . [6932-70]

9:50 am: ****Detection and assessment of wood decay in structural lumber using surface waves**, Henrique L. Reis, Adam Senalik, Univ. of Illinois at Urbana-Champaign . . . . . [6932-71]

Coffee Break. . . . . 10:10 to 10:30 am

SESSION 18

Royal Palm II. . . . . Wed. 9:10 to 10:10 am

Damage Detection

Session Chairs: **Lingyu Yu,** Univ. of South Carolina; **Yohan Lin,** NASA Dryden Flight Research Ctr.

9:10 am: **Development of a high-flow-rate/high-operating frequency NiTinol MEMS valve**, Myunghoon Seong, Kotekar P. Mohanchandra, Gregory P. Carman, Univ. of California/Los Angeles; Yohan Lin, NASA Dryden Flight Research Ctr. . . . . [6932-89]

9:30 am: **Detection of abnormalities in human gait with smart shoes**, Kyoungchul Kong, Joonbum Bae, Masayoshi Tomizuka, Univ. of California/Berkeley . . . . . [6932-90]

9:50 am: ****A multimode sensing system for corrosion detection using piezoelectric wafer active sensors**, Lingyu Yu, Victor Giurgiutiu, Patrick J. Pollock, Univ. of South Carolina. . . . . [6932-91]

Coffee Break. . . . . 10:10 to 10:35 am

SESSION 8

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

Distributed Sensors

Session Chairs: **Hans Poisel,** Georg-Simon-Ohm-Fachhochschule Nürnberg (Germany); **Daniele Inaudi,** Smartec SA (Switzerland)

9:10 am: **Aircraft structural health monitoring using on-board BOCDA system**, Takashi Yari, Masahito Ishioka, Kanehiro Nagai, Mitsubishi Heavy Industries, Ltd. (Japan); Shouji Adachi, Yokogawa Electric Corp. (Japan); Yasuhiro Koshioka, RIMCOF (Japan) . . . . . [6933-29]

9:30 am: **Distributed fiber optic sensor system for dike monitoring using Brillouin optical frequency domain analysis**, Nils Nöther, Aleksander Wosniok, Katerina Krebber, Bundesanstalt für Materialforschung und -prüfung (Germany)[6933-30]

9:50 am: **Experimental investigation of RC beams using BOTDA(R)-FRP-OF sensors**, Zhi Zhou, Harbin Institute of Technology (China). . . . . [6933-31]

Coffee Break. . . . . 10:10 to 10:35 am

SESSION 2

Royal Palm VI . . Wed. 9:30 am to 12:15 pm

Acoustic-Ultrasound NDE

Session Chairs: **H. Felix Wu,** National Institute of Standards and Technology; **Didem Ozevin,** Physical Acoustics Corp.

9:30 am: **Single-crystal piezoelectric composite transducers for ultrasound NDE applications**, Xiaoning Jiang, Kevin A. Snook, Thomas Walker, Wesley S. Hackenberger, TRS Technologies, Inc. . . . . [6934-12]

9:50 am: **Acoustic emission analysis of full-scale honeycomb sandwich composite fuselage panels**, Frank A. Leone, Jr., Drexel Univ. and Federal Aviation Administration; Didem Ozevin, Valery F. Godinez-Azcuaga, Physical Acoustics Corp.; Bao Mosinyi, John G. Bakuckas, Jr., Curtis Davies, David Galella, Paul Swindell, Federal Aviation Administration; Jonathan Awerbuch, Alan Lau, Tein-Min Tan, Drexel Univ. . . . . [6934-14]

Coffee Break. . . . . 10:10 to 10:35 am

SESSION 8

Sunrise . . . . . Wed. 9:10 to 10:10 am

SHM for Aerospace Applications III

Session Chairs: **Kumar V. Jata,** Air Force Research Lab.; **Bernd B. F. Frankenstein,** Fraunhofer-Institut für Zerstörungsfreie Prüfverfahren (Germany)

9:10 am: **Structural health monitoring**, Brandon J. Arritt, Air Force Research Lab.; Michael D. Todd, Univ. of California/San Diego; Lien Ouyang, Acellent Technologies, Inc.; Derek Doyle, New Mexico Institute of Mining and Technology; Erik H. Clayton, Quartus Engineering Inc.; Andrei N. Zagrai, New Mexico Institute of Mining and Technology; Amrita Kumar, Shawn J. Beard, Acellent Technologies, Inc.; Jeffrey M. Ganley, Air Force Research Lab.[6935-38]

9:30 am: **Evaluation of bonded piezoelectric AE sensors for structural health monitoring applications**, Mannur J. Sundaresan, North Carolina A&T State Univ. . . . . [6935-39]

9:50 am: **Resin flow front tracking of vacuum assisted resin transfer moulding (VARTM) using single-mode optical fiber (SMF) and real-time monitoring of resin cure and residual strain using FBG and EFPI sensors**, Jayanta K. Gope, Mayur G. Godbole, Research and Development Establishment (Engineering) (India) . . . . . [6935-40]

Coffee Break. . . . . 10:10 to 10:35 am

SESSION 8

Sunset . . . . . .Wed. 10:20 am to 12:00 pm

Material Modeling I

Session Chair: **Frank Richter,** Ruhr-Univ. Bochum (Germany)

10:20 am: **Thermal modeling of thermally isolated microplates**, Nezih Topaloglu, Patricia M. Nieva, Mustafa Yavuz, Jan Huissoon, Univ. of Waterloo (Canada) . . . . . [6926-33]

10:40 am: **Finite-element-simulations of polycrystalline shape-memory alloys**, Frank Richter, Ruhr-Univ. Bochum (Germany). . . [6926-34]

11:00 am: **Nonlinear solutions for circular membranes and thin plates**, Fuzhang Zhao, Celerity, Inc. . . . . [6926-35]

11:20 am: **Simulation of surface effects in energy dissipation of ultra-high-frequency(UHF) nanocantilevers**, Kun Yan, A. K. Soh, The Univ. of Hong Kong (Hong Kong China) . . . . . [6926-36]

11:40 am: **Modeling of lossy piezoelectric polymers in SPICE**, Ravinder S. Dahiya, Univ. of Genoa (Italy); Maurizio Valle, Univ. degli Studi di Genova (Italy); Leandro Lorenzelli, Fondazione Bruno Kessler (Italy); Giorgio Metta, Univ. degli Studi di Genova (Italy) . . . . . [6926-37]

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

Session 7 Continued

10:30 am: **Feasibility studies for a bionic propulsion system of a blimp based on dielectric elastomers** *(Invited Paper)*, Silvain A. Michel, EMPA (Switzerland); Alexander Bormann, Aeroix (Germany); Christa Jordi, EMPA (Switzerland); Erick Fink, Technische Univ. Berlin (Germany) . . . . . [6927-27]

11:10 am: **An experimentally validated model of a dielectric elastomer bending actuator**, Benjamin M. O'Brien, The Univ. of Auckland (New Zealand); Emilio P. Calius, Industrial Research Ltd. (New Zealand); Shane Xie, Iain A. Anderson, The Univ. of Auckland (New Zealand). . . . . [6927-28]

11:30 am: **PDMS as a dielectric elastomer actuator material**, Sheetal J. Patil, Elisabeth Smela, Univ. of Maryland/College Park . . . . . [6927-29]

11:50 am: **Ion-implantated compliant and patternable electrodes for miniaturized dielectric elastomer actuators**, Samuel Rosset, Muhamed Niklaus, Arnaud Felber, Philippe Dubois, Herbert R. Shea, Ecole Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [6927-30]

12:10 pm: **Study on core free rolled actuator based on soft-dielectric EAP**, Gabor M. Kovacs, EMPA (Hungary); Qibing Pei, Univ. of California/Los Angeles; Lukas Düring, EMPA (Switzerland); Roy D. Kornbluh, SRI International; Soon Mok Ha, Univ. of California/Los Angeles . . . . . [6927-31]

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

SESSION 11

Royal Palm V. .Wed. 10:35 am to 12:35 pm

MR Fluids Integrated Systems.

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

10:35 am: **Temperature sensitive stability of feedback controllers for MR dampers**, David C. Batterbee, Neil Sims, The Univ. of Sheffield (United Kingdom) . . . . . [6928-50]

10:55 am: **Design, modeling, and manufacturing of a mixed mode magnetorheological mount**, The Nguyen, Mohammad H. Elahinia, Univ. of Toledo; Constantin Ciocanel, Northern Arizona Univ.[6928-51]

11:15 am: **Performance of a magnetorheological fluid-elastomer (MRF-E) vibration isolator in a single degree-of-freedom system**, David York, Xiaojie Wang, Faramarz Gordaninejad, Univ. of Nevada/Reno . . . . . [6928-52]

11:35 am: **Semi-active control of building torsion using multiple MR dampers**, David A. Shook, Paul N. Roschke, Texas A&M Univ.; Pei-Yang Lin, Chin-Hsiung Loh, National Ctr. for Research on Earthquake Engineering (Taiwan) . . . . . [6928-53]

11:55 am: **Experimental study of pounding reduction of highway bridge with MR dampers**, Anxin Guo, Zhongjun Li, Hui Li, Harbin Institute of Technology (China). . . . . [6928-54]

12:15 pm: **Hybrid assistive knee braces with smart actuators**, Jinzhou Chen, Wei-Hsin Liao, The Chinese Univ. of Hong Kong (Hong Kong China) . . . . . [6928-91]

Lunch Break . . . . . 12:35 to 2:10 pm

SESSION 9

California. . . . .Wed. 10:35 am to 12:15 pm

Future of SMA II

Session Chaira: **Ibrahim Karaman,** Texas A&M Univ.; **Constantin Ciocanel,** Univ. of Toledo and Northern Arizona Univ.

10:35 am: **High-temperature superelastic response of CoNi(Al,Ga) shape-memory alloys under tension and compression (future of SMA)**, Haluk E. Karaca, Ibrahim Karaman, Texas A&M Univ.; Yuriy Chumlyakov, Siberian Physical Technical Institute (Russia); Hans Maier, Univ. Paderborn (Germany) . . . . . [6929-41]

10:55 am: **Thermomechanical cyclic loading and fatigue life characterization of nickel rich NiTi shape-memory alloy actuators (future of SMA)**, Olivier Bertacchini, Dimitris C. Lagoudas, Texas A&M Univ.; Frederick T. Calkins, James Mabe, The Boeing Co. . . . . [6929-42]

11:15 am: **Improvement in dimensional stability and ductility of TiNiPd shape-memory alloys after severe plastic deformation (future of SMA)**, Kadri C. Atli, Ibrahim Karaman, Benat Kockar, Texas A&M Univ. . . . . [6929-43]

11:35 am: **An integrated numerical aero-elastic study aimed at helicopter blade morphing**, Antonio Concilio, Claudio Testa, Salvatore Ameduri, Ctr. Italiano Ricerche Aerospaziali (Italy); Stefania Leone, Univ. degli Studi di Palermo (Italy) . . . . . [6929-44]

11:55 am: **Large strain variable stiffness composites for shear deformations with applications to morphing aircraft skins**, Geoffrey P. McKnight, Christopher P. Henry, HRL Labs., LLC . . . . . [6929-45]

Lunch/Exhibition Break . . . . . 12:15 to 1:50 pm

SESSION 1

Royal Palm III . . . .Wed. 10:30 to 11:10 am

Keynote Session

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

10:30 am: **Innovative smart microsensors for Army weaponry applications** (Keynote Presentation), Paul B. Ruffin, U.S. Army Aviation and Missile Research, Development and Engineering Ctr.; Christina L. Brantley, U.S. Army Research, Development and Engineering Command; Eugene Edwards, U.S. Army Aviation and Missile Research, Development and Engineering Ctr. . . . . [6931-01]

SESSION 2

Royal Palm III . . Wed. 11:10 am to 12:10 pm

Nano and Micro Devices for Biosensing I

Session Chair: **Z. Ryan Tian,** Univ. of Arkansas

11:10 am: **Hierarchical nanostructures of bioceramics for new therapeutics**, Z. Ryan Tian, Vijay K. Varadan, Univ. of Arkansas . . . . . [6931-02]

11:30 am: **Development of an IrOx micro pH sensor array on flexible polymer substrate**, Wen Ding Huang, Jung-Chih Chiao, Jianqun Wang, Thermpon Ativanichayaphong, The Univ. of Texas at Arlington . . . . . [6931-03]

11:50 am: **Screen-printed carbon electrodes for amperometric glucose sensing**, Lavanya L. Aryasomayajula, Jining Xie, Vijay K. Varadan, Univ. of Arkansas. . . . . [6931-04]

Lunch Break . . . . . 12:10 to 1:30 pm

Session 15 runs concurrently with session 19.

SESSION 15

Royal Palm I . .Wed. 10:30 am to 12:30 pm

Modeling and Mechanics

Session Chairs: **Amr M. Baz,** Univ. of Maryland/College Park; **Hoon Sohn,** Korea Advanced Institute of Science and Technology (South Korea)

10:30 am: ****Monitoring the bending and twist of morphing structures**, Amr M. Baz, Jason Smoker, Univ. of Maryland/College Park . . . . . [6932-72]

10:50 am: ****Optimization of sensor introduction into laminated composite materials**, Kristin L. Schaaf, Siavouche Nemat-Nasser, Univ. of California/San Diego . . . . . [6932-73]

11:10 am: **Three-parameter elastic foundation model of piezoelectric smart beams**, Jialai Wang, The Univ. of Alabama at Tuscaloosa . . . . . [6932-74]

11:30 am: **Estimation of deflections of bridge by two-step model updating approach based on ambient acceleration measurements**, Soojin Cho, Korea Advanced Institute of Science and Technology (South Korea); Jin-Hak Yi, Korea Ocean Research and Development Institute (South Korea); Chung-Bang Yun, Korea Advanced Institute of Science and Technology (South Korea) . . . . . [6932-75]

11:50 am: **Analytical and experimental evaluation of vehicle-bridge interaction**, Ji-Seong Jo, POSCO Technical Research Labs. (South Korea); Bong-Ho Cho, Research Institute of Industrial Science and Technology (South Korea); Hongjin Kim, Kyungpook National Univ. (South Korea) . . . . . [6932-76]

12:10 pm: ****Sensitivity analysis of a luminescent photoelastic coating**, Ergin Esirgemez, Claudio Lira, James P. Hubner, The Univ. of Alabama at Tuscaloosa . . . . . [6932-02]

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

SESSION 19

Royal Palm II. .Wed. 10:35 am to 12:35 pm

Fiber Optic Sensors for SHM

Session Chairs: **Roman P. Ostroumov,** Luna Innovations, Inc.; **Oluwaseyi Balogun,** Northwestern Univ.

10:35 am: **Estimation of flexural properties degradation in composite sandwich structures using fiber Bragg grating sensors**, Byeongwook Jang M.D., Korea Advanced Institute of Science and Technology (South Korea) . . . . . [6932-92]

10:55 am: **Fiber optics based ion discriminator**, Roman P. Ostroumov, Bryan D. Dickerson, Robert S. Fielder, Luna Innovations Inc. . . . . [6932-93]

11:15 am: ****Optimal demodulation of wavelength shifts in a fiber Bragg grating sensor using an adaptive two wave mixing photorefractive interferometer**, Oluwaseyi Balogun, Goutham R. Kirikera, Sridhar Krishnaswamy, Northwestern Univ. . . . . [6932-94]

11:35 am: **Flow direction discrimination sensor using FBG optical fiber and leverage amplification mechanism**, Yoshihiro Kikushima, National Institute of Advanced Industrial Science and Technology (Japan); Yoshinobu Iwai, Ibaraki Univ. (Japan); Hiroyuki Abe, Hiro Yoshida, National Institute of Advanced Industrial Science and Technology (Japan) . . . . . [6932-95]

11:55 am: **Design and laboratory validation of a structural element instrumented with multiplexed interferometric fiber optic sensors**, Daniele Zonta, Matteo Pozzi, Huayong Wu, Univ. degli Studi di Trento (Italy); Daniele Inaudi, Smartec SA (Switzerland) . . . . . [6932-96]

12:15 pm: **Performance of the fiber Bragg grating sensors at low temperatures**, Zhan-Sheng Guo, Shanghai Univ. (China) . . . . . [6932-97]

Lunch/Exhibition Break . . . . . 12:35 to 1:30 pm

SESSION 9

Royal Palm IV . . .Wed. 10:35 am to 12:15 pm

Polymer Optical Fiber Sensors

Session Chairs: **Horst J. Baier,** Technische Univ. München (Germany); **Jennifer E. Michaels,** Georgia Institute of Technology

10:35 am: **Smart technical textiles with integrated POF sensors** *(Invited Paper)*, Katerina Krebber, Bundesanstalt für Materialforschung und -prüfung (Germany) . . . . . [6933-32]

11:15 am: **Polymer in-fiber interferometer for large strain measurements** *(Invited Paper)*, Sharon Kiesel, Kara J. Peters, Tasnim Hassan, Mervyn Kowalsky, North Carolina State Univ. . . . . [6933-33]

11:55 am: **Finite element formulation for self-writing of polymer optical fiber sensors**, Aliesha D. Anderson, Kara J. Peters, North Carolina State Univ. . . . . [6933-34]

Lunch/Exhibition Break . . . . . 12:15 to 1:30 pm

SESSION 2 Continued

10:35 am: **Determination of crystallographic texture in metal sheets using ultrasound and EBSD**, Stuart B. Palmer, Steven M. Dixon, Mark Potter, Stephen Essex, The Univ. of Warwick (United Kingdom) . . . . . [6934-15]

10:55 am: **Simulation of AE from delaminations and cracks in composites**, Bernhard R. Tittmann, The Pennsylvania State Univ.; Stefanie Fladischer, Technische Univ. Graz (Austria); Subash Jayaraman, Manton J. Guers, The Pennsylvania State Univ. . . . . [6934-16]

11:15 am: **Failure progression monitoring of advanced composite bridge components using acoustic emissions sensors**, John B. Kosmatka, David J. Klein, Marc J. Robinson, Eduardo Velazquez, Univ. of California/San Diego . . . . . [6934-17]

11:35 am: **Applications of acoustic emission for civil infrastructure**, Paul H. Ziehl, Univ. of South Carolina . . . . . [6934-18]

11:55 am: **Acoustic emission monitoring and critical failure identification of bridge cable damage**, Dongsheng Li, Dalian Univ. of Technology (China) . . . . . [6934-19]

Lunch/Exhibition Break . . . . . 12:15 to 1:30 pm

SESSION 9

Sunrise . . . . . .Wed. 10:35 am to 12:15 pm

Modeling for SHM Applications I

Session Chairs: **Sridhar Krishnaswamy,** Northwestern Univ.; **Sauvik Banerjee,** St. Louis Univ.

10:35 am: **Fluid-coupled slow wave for remote sensing**, Michal Bezdek, Kathy L. Joseph, Manton J. Guers, Bernhard R. Tittmann, The Pennsylvania State Univ. . . . . [6935-41]

10:55 am: **Effect of transducer boundary conditions on the generated ultrasonic field**, Tamaki Yanagita, The Univ. of Arizona; Dominique Placko, Ecole Normale Supérieure de Cachan (France); Tribikram Kundu, The Univ. of Arizona. . . . . [6935-42]

11:15 am: **Finite element simulation of two points source method: its use for damage detection in concrete structures**, Jinho Woo, Won-Bae Na, Dongwoo Woo, Pukyong National Univ. (South Korea) [6935-43]

11:35 am: **A differential method for the determination of the time-of-flight for ultrasound under pulsed wide-band excitation including chirped signals**, Khurram S. Tarar, Evgeny Twerdowski, Reinhold Wannemacher, Wolfgang Grill, Univ. Leipzig (Germany) . . . . . [6935-44]

11:55 am: **Theoretical modeling of acoustic emission waveforms from delamination sources in multilayered composite plates**, Sauvik Banerjee, St. Louis Univ.; Ajit K. Mal, Univ. of California/Los Angeles. . . . . [6935-45]

Lunch/Exhibition Break . . . . . 12:15 to 1:30 pm

SESSION 9

Sunset . . . . . .Wed. 1:30 to 2:30 pm

Material Modeling II

Session Chair: **Ivindra Pane,** Institut Teknologi Bandung (Indonesia)

1:30 pm: **Roles of substrate and film properties upon remnant polarisation of ferroelectric thin film memory**, Ivindra Pane, Institut Teknologi Bandung (Indonesia); John E. Huber, Univ. of Oxford (United Kingdom) . . . . . [6926-38]

1:50 pm: **New silicone dielectric elastomers with a high-dielectric constant**, Zhen Zhang, Yanju Liu, Liwu Liu, Liang Shi, Jinsong Leng, Harbin Institute of Technology (China). . . . . [6926-39]

■ **Conference End**

SESSION 8

Golden West . . . . . Wed. 1:30 to 3:10 pm

Modeling and Simulation

Session Chairs: **Thomas Wallmersperger,** Univ. Stuttgart (Germany); **Zhigang Suo,** Harvard Univ.

1:30 pm: **Coupled chemo-electro-mechanical simulation of polyelectrolyte gels as actuators and sensors**, Thomas Wallmersperger, Dirk Ballhause, Bernd H. Kröplin, Univ. Stuttgart (Germany); Margarita Günther, Zhangman Shi, Gerald U. Gerlach, Technische Univ. Dresden (Germany) . . . . [6927-32]

1:50 pm: **Redox level-dependent impedance model for conjugated polymer actuators,** Yang Fang, Xiaobo Tan, Gursel Alici, Michigan State Univ. . . . . [6927-70]

2:10 pm: **A theory of large deformation in soft active materials**, Zhigang Suo, Xuanhe Zhao, Harvard Univ.; William H. Greene, Coventor, Inc.; Jinxiong Zhou, Xi'an Jiaotong Univ. (China) . . . . . [6927-34]

2:30 pm: **An advanced finite element model of IPMC**, Deivid Pugal, Heiki Kasemägi, Maarja Kruusmaa, Alvo Aabloo, Tartu Ülikool (Estonia) . . . . . [6927-35]

2:50 pm: **Modelling electroactive polymer (EAP) actuators for flow control: electro-mechanical coupling and hyperelasticity**, Florence Rosenblatt, Lorenzo Iannucci, Jonathan F. Morrison, Imperial College London (United Kingdom) . . . . . [6927-36]

Coffee Break. . . . . .3:10 to 3:40 pm

SESSION 12

Royal Palm V. . . . . Wed. 2:10 to 3:10 pm

Biology Inspired Systems

Session Chair: **Ephrahim Garcia,** Cornell Univ.

2:10 pm: **Application of macrofiber composite in actuating a tail of biomimetic fish**, Da Wang, Weilong Yin, Yanju Liu, Jinsong Leng D.D.S., Xuelian Wu, Harbin Institute of Technology (China) [6928-55]

2:30 pm: **Insect inspired wing actuation structures based on ring-type resonators**, Caspar T. Bolsman, Hans F. L.Goosen, Fred van Keulen, Technische Univ. Delft (Netherlands) . . . . . [6928-56]

2:50 pm: **Passive self repairing and active self sensing in multifunctional polymer composites**, Carolyn M. Dry, Natural Process Design, Inc.[6928-59]

Coffee Break. . . . . .3:10 to 3:40 pm

SESSION 10

California. . . . . .Wed. 1:50 to 3:10 pm

Shape-Memory Materials I

Session Chairs: **Christopher P. Henry,** HRL Labs., LLC; **Marcelo J. Dapino,** The Ohio State Univ.

1:50 pm: **Thermomechanical characterization of the nonlinear rate-dependent response of shape-memory polymers**, Brent Volk, Dimitris C. Lagoudas, Texas A&M Univ.; Yi-Chao Chen, Univ. of Houston . . . . . [6929-46]

2:10 pm: **Damping of high-temperature shape-memory alloys**, Kirsten P. Duffy, Univ. of Toledo; Santo A. Padula II, NASA Glenn Research Ctr.; Daniel A. Scheiman, ASRC Aerospace Corp. . . . . [6929-48]

2:30 pm: **Simultaneous transformation and plastic/viscoplastic deformation in shape-memory alloys**, Darren J. Hartl, Dimitris C. Lagoudas, Texas A&M Univ. . . . . [6929-49]

2:50 pm: **Self-healing simulation of a shape-memory alloy composite**, Arvind K. Sharma, Dinesh K. Harursampath, Indian Institute of Science (India) . . . . . [6929-50]

Coffee Break. . . . . .3:10 to 3:40 pm

SESSION 3

Royal Palm III . . . . . Wed. 1:30 to 2:10 pm

Keynote Session

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

1:30 pm: **Nanoscale materials for engineering and medicine** (Keynote Presentation), Mark Schulz, Vesselin N. Shanov, YeoHeung Yun, Univ. of Cincinnati . . . . . [6931-05]

SESSION 4

Royal Palm III . . . . . Wed. 2:10 to 3:10 pm

Nanowire, Nanotubes, and Nanostructures

Session Chair: **Ashok Srivastava,** Louisiana State Univ.

2:10 pm: **Multifunctional low-cost bioceramic nanowires for water filteration**, Z. Ryan Tian, Vijay K. Varadan, Univ. of Arkansas . . . . . [6931-06]

2:30 pm: **Microwave applications of carbon nanotubes: nano-antennas and nano-switches**, Afshin Ziaei, Thales Research & Technology (France). . . . . [6931-07]

2:50 pm: **Current transport modeling in carbon-nanotube field-effect transistors (CNT-FETs) and biosensing applications**, Jose M. Marulanda, Ashok Srivastava, Louisiana State Univ.; Ashwani K. Sharma, Air Force Research Lab.. . . . . [6931-08]

Coffee Break. . . . . .3:10 to 3:40 pm

Session 16 runs concurrently with session 20.

SESSION 16

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

Signal Processing I

Session Chairs: **Jann N. Yang,** Univ. of California/Irvine; **Ser-Tong Quek,** National Univ. of Singapore (Singapore)

1:30 pm: **Input force identification by using system identification techniques: Kalman filter with a recursive estimator**, Ai-Lun Wu, Chin-Hsiung Loh, National Taiwan Univ. (Taiwan); Jann N. Yang, Univ. of California/Irvine . . . . . [6932-77]

1:50 pm: **Low-power feedback-enhanced electromechanical impedance (FEMI) sensors**, Jieun Jang, Patrick Yue, Univ. of California/Santa Barbara. . . . . [6932-79]

2:10 pm: ****Comparison of various structural damage tracking techniques based on experimental data**, Hongwei Huang, Tongji Univ. (China); Jann N. Yang, Univ. of California/Irvine; Lily L. Zhou, Nanjing Univ. of Aeronautics and Astronautics (China) . . . . . [6932-80]

2:30 pm: **Structural damage assessment using damage locating vector with limited sensors**, Viet-Anh Tran, Ser-Tong Quek, National Univ. of Singapore (Singapore) . . . . . [6932-81]

2:50 pm: **Reduction of shock noise using acoustic nonlinear energy sink technology**, Li Zhou, Yancheng Wu, Nanjing Univ. of Aeronautics and Astronautics (China) . . . . . [6932-162]

Coffee Break. . . . . 3:10 to 3:40 pm

SESSION 20

Royal Palm II. . . . . .Wed. 1:30 to 3:10 pm

SHM for Composite Materials

Session Chairs: **Henrique L. Reis,** Univ. of Illinois at Urbana-Champaign; **Henry A. Sodano,** Arizona State Univ.

1:30 pm: ****Evaluation of adhesive bond quality in laminated safety glass using guided waves: a parametric study**, Henrique L. Reis, Shihong Huo, Univ. of Illinois at Urbana-Champaign . . . . [6932-98]

1:50 pm: **Shape identification of variously deformed composite laminates using Brillouin type distributed strain sensing system with embedded optical fibers**, Mayuko Nishio, Tadahito Mizutani, Nobuo Takeda, The Univ. of Tokyo (Japan) . . . . . [6932-99]

2:10 pm: **Smart composite structure based on integrated passive wireless strain sensors**, Zi Jing Wong, Chun-Gon Kim, Korea Advanced Institute of Science and Technology (South Korea) . . [6932-100]

2:30 pm: **Concept and model of a piezoelectric structural fiber for multifunctional composites**, Yirong Lin, Henry A. Sodano, Arizona State Univ. . . . . [6932-101]

2:50 pm: **Robustness of vibration-based health assessment of bonded composite patch repairs**, Caleb M. White, Royal Melbourne Institute of Technology (Australia); Brendan O. Whittingham, Monash Univ. (Australia); Henry C. H.Li, Royal Melbourne Institute of Technology (Australia); Israel Herszberg, Cooperative Research Ctr. for Advanced Composite Structures Ltd. (Australia); Adrian P. Mouritz, Royal Melbourne Institute of Technology (Australia) . . . . . [6932-102]

Coffee Break. . . . . 3:10 to 3:40 pm

SESSION 10

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

Sensors for Non Destructive Evaluation

Session Chairs: **Jinping Ou,** Harbin Institute of Technology (China); **Matthew J. Whelan,** Clarkson Univ.

1:30 pm: **POF strain sensor using phase measurement techniques** *(Invited Paper)*, Hans Poisel, Georg-Simon-Ohm-Fachhochschule Nürnberg (Germany). . . . . [6933-35]

2:10 pm: **Ultrasonic structural health monitoring: strategies, issues, and progress** *(Invited Paper)*, Jennifer E. Michaels, Georgia Institute of Technology. . . . . [6933-36]

2:50 pm: **Video-based monitoring of structural damage: a case study on concrete surface cracks**, ZhiQiang Chen, Tara C. Hutchinson, Univ. of California/San Diego. . . . . [6933-37]

Coffee Break. . . . . 3:10 to 3:40 pm

SESSION 3

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

Applied Imaging

Session Chairs: **Chin-An Tan,** Wayne State Univ.; **Xiaoning Jiang,** TRS Technologies, Inc.

1:30 pm: **Investigation of fiber waviness in a thick glass composite beam using THz NDE**, Robert F. Anastasi, NASA Langley Research Ctr. . . . [6934-20]

1:50 pm: **Through-wall electromagnetic imaging for infrastructure evaluation**, Brian J. Tucker, Douglas L. McMakin, Pacific Northwest National Lab. . . . . [6934-21]

2:10 pm: **Inductive thermal excitation for NDE of conductive media in composite structures**, Gary E. Georgeson, The Boeing Co.. . . . . [6934-22]

2:30 pm: **Ear recognition based on the edge information of the auricle contour**, Jiamin Liu, Ling Wang, Chongqing Univ. (China); Tianwei Ma, Univ. of Hawai'i at Manoa; Yijun Lan, Chongqing Univ. (China) . . . . . [6934-23]

2:50 pm: **Ultrasonic phased array inspection imaging technology for NDT of offshore platform structures**, Baohua Shan, Hua Wang, Zhongdong Duan, Harbin Institute of Technology (China); Jinping Ou, Dalian Univ. of Technology (China) . . . [6934-24]

Coffee Break. . . . . 3:10 to 3:40 pm

SESSION 10

Sunrise . . . . . .Wed. 1:30 to 3:10 pm

Novel Instrumentation and Sensing for SHM I

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

1:30 pm: **A novel polymeric magnetostrictive fiber optic sensor system**, Wei-Chih Wang, Univ. of Washington . . . . . [6935-46]

1:50 pm: **Determination of the velocity of sound with high-resolution by ultrasonic imaging of wedge shaped objects in transmission with vector contrast**, U. Amjad, Yeshwant K. Verma, Joseph Ndop, Wolfgang Grill, Univ. Leipzig (Germany). . . . . [6935-47]

2:10 pm: **Enhanced image capabilities for industrial radiography applications using megavoltage x-ray sources and digital flat panels**, James E. Clayton, Gary F. Virshup, Varian Medical Systems, Inc. . . . . [6935-48]

2:30 pm: **Fiberoptic viscosity sensor**, Wei-Chih Wang, Univ. of Washington . . . . . [6935-49]

2:50 pm: **Stand-off detection of mixed radiation fields**, George C. Giakos, Univ. of Akron. . [6935-50]

Coffee Break. . . . . 3:10 to 3:40 pm

SESSION 9

Golden West . . . . . .Wed. 3:40 to 6:00 pm

Energy Harvesting using EAP

Session Chairs: **Minoru Taya,** Univ. of Washington; **Roy D. Kornbluh,** SRI International

3:40 pm: **Organics-based energy harvesting and storage system for future aerospace vehicles: overview** *(Invited Paper)*, Minoru Taya, Univ. of Washington . . . . . [6927-37]

4:20 pm: **Laminated polymer lithium rechargeable battery**, Chunye Xu, Chao Ma, Minoru Taya, Univ. of Washington . . . . . [6927-38]

4:40 pm: **Innovative power generators using electroactive polymer artificial muscle**, Roy D. Kornbluh, Seiki Chiba, SRI International; Mikio Waki, Hyper Drive Corp. (Japan); Ron Pelrine, SRI International . . . . . [6927-39]

5:00 pm: **Dielectric polymer: scavenging energy from human motion**, Claire Jean-Mistral, Commissariat à l'Energie Atomique (France); Skandar Basrour, TIMA Lab. (France); Jean-Jacques Chaillout, Commissariat à l'Energie Atomique (France)[6927-40]

5:20 pm: **Improving the electrical conductivity by forming Ni powder chains in a shape-memory polymer filled with carbon black**, Xin Lan, Jinsong Leng, Harbin Institute of Technology (China); Weimin Huang, Na Liu, Nanyang Technological Univ. (Singapore); Shanyi Du, Harbin Institute of Technology (China). . . . . [6927-41]

5:40 pm: **Design of dye-sensitized solar cells with new light-harvesting dyes**, Morio Nagata, Mutsumi Kimura, Chunye Xu, Minoru Taya, Univ. of Washington . . . . . [6927-42]

SESSION 13

Royal Palm V. . . . . Wed. 3:40 to 4:20 pm

Civil Systems

Session Chairs: **Aditi Chattopadhyay,** Arizona State Univ.; **Seung-Bok Choi,** Inha Univ. (South Korea)

3:40 pm: **Seismic retrofitting of bridge columns using shape memory alloys**, Bassem O. Andarwes, Univ. of Illinois at Urbana-Champaign . . . . [6928-60]

4:00 pm: **Vibration isolation of multistory building by genetic algorithm**, Ashkan Rezaei, Mohammad Taghi Ahmadian, Sharif Univ. of Technology (Iran) . . . . . [6928-61]

SESSION 11

California. . . . . .Wed. 3:40 to 6:00 pm

Shape-Memory Materials II

Session Chairs: **Ralph C. Smith,** North Carolina State Univ.; **John A. Shaw,** Univ. of Michigan

3:40 pm: **Shakedown response of shape-memory alloy wire: experiments and modeling**, Christopher B. Churchill, John A. Shaw, Univ. of Michigan; Louis Hector, Pablo Zavattieri, General Motors Corp.. . . . . [6929-51]

4:00 pm: **Performance of shape-memory alloy cables**, Benjamin Reedlunn, John A. Shaw, Univ. of Michigan. . . . . [6929-52]

4:20 pm: **A model for the shape-memory effects in shape-memory polymers**, Ryan D. Siskind, North Carolina State Univ. . . . . [6929-53]

4:40 pm: **Development of multifunctional wire that combines shape-memory alloy to piezo electric material**, Hiroshi Sato, National Institute of Advanced Industrial Science and Technology (Japan) [6929-54]

5:00 pm: **Structural evaluation of a nickel-base super-alloy metal foam**, Ali Abdul-Aziz, Louis Ghosn, Richard Rauser, NASA Glenn Research Ctr.; Philippe Young, Univ. of Exeter (United Kingdom) . . . . . [6929-55]

5:20 pm: **Carbon nanotube (CNT) fins for enhanced cooling of shape-memory alloy wire**, Anupam Pathak, Univ. of Michigan; Joseph AuBuchon, Sungho Jin, Univ. of California/San Diego; John A. Shaw, Diann E. Brei, Jonathan E. Luntz, Univ. of Michigan. . . . . [6929-56]

5:40 pm: **Electro-induced shape-memory polymer nanocomposite containing conductive particles and short fibers**, Haibao Lv, Harbin Institute of Technology (China). . . . . [6929-57]

SESSION 5

Royal Palm III . . . . . .Wed. 3:40 to 5:20 pm

Micro/Nano Devices and MEMS

Session Chairs: **Jae Hyung Kim,** Inje Univ. (South Korea); **Hargsoon Yoon,** Univ. of Arkansas

3:40 pm: **Conductive nanoparticles in electro-activated shape-memory polymer sensor and actuator**, Jinsong Leng, Haibao Lv, Yanju Liu, Shanyi Du, Harbin Institute of Technology (China) . . . . . [6931-09]

4:00 pm: **Schottky diode made on cellulose paper with PEDOT:PSS and pentacene**, Jaehwan Kim, Hyun Kyu Lim, Sang Yeol Yang, Kwang Sun Kang, Inha Univ. (South Korea). . . . . [6931-10]

4:20 pm: **Pre- and post-machining and release residual stresses in microelectromechanical systems (MEMS)**, Mary E. Vechery, Univ. of Maryland/College Park; Andrew J. Dick, Rice Univ.; Balakumar Balachandran, Univ. of Maryland/College Park; Madan Dubey, Army Research Lab. [6931-11]

4:40 pm: **Microcontact printing method for metal micro-patterning with polyurethane mold**, Jaehwan Kim, Kwangjoon Han, Kwang Sun Kang, Inha Univ. (South Korea) . . . . . [6931-12]

5:00 pm: **Study on shape recovery speed of SMP, SMP composite, and SMP foam**, Xuelian Wu, Yanju Liu, Jinsong Leng D.D.S., Harbin Institute of Technology (China). . . . . [6931-13]

Session 17 runs concurrently with session 21.

SESSION 17

Royal Palm I . . . . . .Wed. 3:40 to 6:00 pm

Signal Processing II

Session Chairs: **Michael D. Todd,** Univ. of California/San Diego; **Chih-Chen Chang,** Hong Kong Univ. of Science and Technology (Hong Kong China)

3:40 pm: **A regularization scheme for displacement reconstruction**, Yun Hwa Hong, Hae Sung Lee, Seoul National Univ. (South Korea); Hyun Woo Park, Dong-A Univ. (South Korea) . . . . . [6932-83]

4:00 pm: **Tracking time-varying properties of hysteretic structure by wavelet multiresolution analysis**, Chih-Chen Chang, Yuan Feng Shi, Hong Kong Univ. of Science and Technology (Hong Kong China) . . . . . [6932-84]

4:20 pm: **Filtering techniques in the dynamic deformation estimation using multiple strains measured by FBGs**, Johannes Treiber, Korea Advanced Institute of Science and Technology (South Korea); Uwe C. Mueller, Technische Univ. München (Germany); Jae-Hung Han, Korea Advanced Institute of Science and Technology (South Korea); Horst J. Baier, Technische Univ. München (Germany) . . . . . [6932-85]

4:40 pm: **Sensor-based warranty system for improving seismic performance of building structures**, Ryu Miyamoto, Akira Mita, Keio Univ. (Japan) . . . . . [6932-86]

5:00 pm: **Vibration-based damage detection algorithms for combined stiffness-loss and prestress-loss in PSC bridges**, Jeong-Tae Kim, Yeon-Sun Ryu, Jae-Hyung Park, Jung-Mi Lee, So-Young Lee, Pukyong National Univ. (South Korea) . . . . . [6932-87]

5:20 pm: **Robust water leakage detection approach using sound signals and pattern recognition**, Yuriko Terao, Akira Mita, Keio Univ. (Japan) . . . . . [6932-88]

5:40 pm: **Demonstration of detectability of SHM system with FBG/PZT hybrid system in composite wing box structure,** Hideki Soejima, Toshimichi Ogisu, Hiroshi Yoneda, Fuji Heavy Industries, Ltd. (Japan); Yoji Okabe, Nobuo Takeda, The Univ. of Tokyo (Japan); Yasuhiro Koshioka, RIMCOF (Japan) . . . . . [6932-01]

SESSION 21

Royal Palm II. . . . . .Wed. 3:40 to 6:00 pm

Vibration SHM and Other Sensors

Session Chairs: **Shi Yan,** Shenyang Architectural and Civil Engineering Univ. (China); **Stewart Sherrit,** Jet Propulsion Lab.

3:40 pm: **Numerical and experimental research on active vibration control of flexible structures using PZT patches**, Shi Yan, Hao Zhang, Shenyang Architectural and Civil Engineering Univ. (China); Gangbing Song, Univ. of Houston . . . . . [6932-103]

4:00 pm: **Vibration control of hysteretic and frictional systems via neural network adaptive backstepping**, Mauricio Zapateiro, Ningsu Luo, Univ. de Girona (Spain) . . . . . [6932-104]

4:20 pm: **Embeddable sensor mote for structural monitoring**, James W. Fonda, Steve E. Watkins, Jagannathan Sarangapani, Univ. of Missouri/Rolla . . . . . [6932-105]

4:40 pm: **Design of piezoelectric sensors, actuators, and energy harvesting devices using topology optimization**, Paulo H. Nakasone, Emílio C. N.Silva, Escola Politécnica da Univ. de São Paulo (Brazil) . . . . . [6932-106]

5:00 pm: **Microhorn array (SMIHA) for acoustic matching**, Stewart Sherrit, Xiaoqi Bao, Yoseph Bar-Cohen, Jet Propulsion Lab. . . . . [6932-107]

5:20 pm: ****Biology-inspired acoustic sensors for sound source localization**, Zhong Chen, Miao Yu, Univ. of Maryland/College Park . . . . . [6932-108]

5:40 pm: **A novel thermally driven actuator based upon the physics of metal hydrides**, Kwangmok Jung, Il-Seok Park, Jin-Kyeong Kim, Kwang J. Kim, Univ. of Nevada/Reno . . . . . [6932-109]

SESSION 11

Royal Palm IV . . . . . Wed. 3:40 to 5:40 pm

Fiber Optic Sensors in Civil Engineering

Session Chairs: **Katerina Krebber,** Bundesanstalt für Materialforschung und -prüfung (Germany); **Joseph Grant,** NASA Stennis Space Ctr.

3:40 pm: **Applications of optical fiber sensors of SHM in infrastructures** *(Invited Paper)*, Jinping Ou, Zhi Zhou, Harbin Institute of Technology (China) . . . . . [6933-38]

4:20 pm: **FBG-based intelligent monitoring system of the Tianjin Yonghe Bridge**, Chunguang Lan, Zhi Zhou, Harbin Institute of Technology (China)[6933-39]

4:40 pm: **Permanent and remote monitoring of large ships with optical fiber sensors**, Daniele Inaudi, Daniele Posenato, Angelo Figini, Smartec SA (Switzerland); Giovanni Tassara, Pegaso Systems s.r.l. (Italy) . . . . . [6933-40]

5:00 pm: **Research and development of smart GFRP-OFBG-based steel strand and its application in monitoring of prestress loss for RC structures**, Zhi Zhou, Hui Zhou, Harbin Institute of Technology (China) . . . . . [6933-42]

5:20 pm: **Torque sensing using rolled galfenol patches**, Matthew J. Parsons, Univ. of Maryland/College Park . . . . . [6933-43]

■ **Conference End**

SESSION 4

Royal Palm VI . . . . . Wed. 3:40 to 5:40 pm

Civil Infrastructure Health Monitoring

Session Chairs: **Ming L. Wang,** Univ. of Illinois at Chicago; **Tara C. Hutchinson,** Univ. of California/San Diego

3:40 pm: **An image reconstruction method by deconvolution for ECT**, Akira Sasamoto, Takayuki Suzuki, Yoshihiro Nishimura, National Institute of Advanced Industrial Science and Technology (Japan) . . . . . [6934-51]

4:00 pm: **MEMS microphone sensor for roadway safety monitoring**, Guo-Hua Feng, National Chung Cheng Univ. (Taiwan); Hung-Chi Chung, ImageCat, Inc. . . . . [6934-26]

4:20 pm: **Fast EM stress sensors for large steel cables**, Yang Zhao, Intelligent Instrument System; Ming L. Wang, Univ. of Illinois at Chicago [6934-28]

4:40 pm: **Application of time-frequency analysis in data processing using impact echo on soil nail**, Wen Chung Ko, Sinotech Engineering Consultants Ltd. (Taiwan) . . . . . [6934-29]

5:00 pm: **Structural damage detection for long-span cable-stayed bridge under varying temperature and humidity conditions**, Wensong Zhou, Harbin Institute of Technology (China); Houssein Nasser, Ctr. de Recherche Public Henri Tudor (Luxembourg) . . . . . [6934-30]

5:20 pm: **Highly nonlinear waves' sensor technology for highway infrastructures**, Devvrath Khatri, Chiara Daraio, California Institute of Technology; Piervincenzo Rizzo, Univ. of Pittsburgh . . . . . [6934-25]

SESSION 11

Sunrise . . . . . .Wed. 3:40 to 6:00 pm

SHM for Civil Infrastructure Applications

Session Chairs: **Hwai-Chung Wu,** Wayne State Univ.; **Perngjin Frank Pai,** Univ. of Missouri/Columbia

3:40 pm: **Acoustic emission monitoring of FRP reinforced concrete**, Sandeep Degala, Karthik Ramanathan, Piervincenzo Rizzo, Kent A. Harries, Univ. of Pittsburgh . . . . . [6935-51]

4:00 pm: **Wireless ultrasonic guided-wave tomography for corrosion monitoring in pipes**, Jaya P. Koduru, Luke J. Breon, Joseph L. Rose, The Pennsylvania State Univ. . . . . [6935-52]

4:20 pm: **Hybrid vibration-impedance approaches for damage detection in plate-girder bridges**, Dong-Soo Hong, Han-Sung Do, Jeong-Tae Kim, Won-Bae Na, Hyun-Man Cho, Pukyong National Univ. (South Korea) . . . . . [6935-53]

4:40 pm: **Measurement of modal amplitudes of guided waves in rails**, Philip W. Loveday, Craig S. Long, Council for Scientific and Industrial Research (South Africa) . . . . . [6935-54]

5:00 pm: **Damage detection in concrete and cementitious composites**, Hwai-Chung Wu, Wayne State Univ. . . . . [6935-55]

5:20 pm: **Introduction of structural health and safety monitoring warning system for Shenzhen-Hongkong western corridor Shenzhen Bay Bridge**, Na Li, Xinyue Zhang, Xiantong Zhou, Jun Leng, Zhu Liang, China Highway Planning and Design Institute Consultants, Inc. (China) . . . . . [6935-56]

5:40 pm: **Local health monitoring of Sifangtai Bridge using fiber Bragg grating sensors**, Xuefeng Zhao, Dalian Univ. of Technology (China); Jinping Ou, Harbin Institute of Technology (China) and Dalian Univ. of Technology (China) . . . . . [6935-57]

Golden West Room

8:00 to 8:05 am: **Announcements and Awards**

8:05 to 8:20 am: **Funding Agency-AFOSR Talk**
Byung-Lip (Les) Lee, Air Force Office of Scientific Research

8:20 to 9:05 am: **Plenary Presentation: European Research Strategy in Aeronautics and Space: Smart Materials and Health Monitoring**
Theodore Marikas, Univ. Ioannina (Greece) and **Vassilis Kostopoulos,** Univ. Patras (Greece)

Session 10 runs concurrently with sessions 11 & 12.

SESSION 10

San Diego . . . . . Thurs. 9:10 am to 11:55 pm

Application of EAP to Robotics

Session Chairs: **Gordon G. Wallace,** Univ. of Wollongong (Australia); **Reinhard Schwödiauer,** Johannes Kepler Univ. Linz (Austria)

9:10 am: **Dynamic modeling of underwater vehicles actuated by soft actuators**, Shivakanth Gutta, Joon-Soo Lee, Woosoon Yim, Univ. of Nevada/Las Vegas; Kwang J. Kim, Univ. of Nevada/Reno . . . . . [6927-43]

9:30 am: **Bio-inspired tactile sensor with arrayed structures based on electroactive polymers**, Jin Wang, Chunye Xu, Minoru Taya, Yasuo Kuga, Univ. of Washington [6927-44]

9:50 am: **An adaptive control method for dielectric elastomer devices**, Todd A. Gisby, Iain A. Anderson, The Univ. of Auckland (New Zealand); Emilio P. Calius, Industrial Research Ltd. (New Zealand); Shane Xie, The Univ. of Auckland (New Zealand). . . . . [6927-45]

Coffee Break. . . . . 10:10 to 10:35 am

10:35 am: **Potentials of thermally expandable polymers with embedded skeletons for actuator applications**, Gih Keong Lau, Johannes F. L.Goosen, Fred van Keulen, Technische Univ. Delft (Netherlands). . . . . [6927-47]

10:55 am: **The application of polypyrrole trilayer actuators in microfluidics and robotics**, Paul A. Kilmartin, Rudolf Kiefer, Rosalind Archer, Bruce A. MacDonald, Graham A. Bowmaker, Ralph P. Cooney, Jadranka Travas-Sejdic, The Univ. of Auckland (New Zealand) . . . . [6927-48]

11:15 am: **An electroactive polymer-based concept for vibration reduction via adaptive supports**, Kai Wolf, Technische Univ. Darmstadt (Germany); Frerk Haase, Fraunhofer-Institut für Betriebsfestigkeit und Systemzuverlässigkeit (Germany); Tobias Roeglin, Technische Univ. Darmstadt (Germany); Torsten Finnberg, Bernd Steinhoff, Deutsches Krankenhaus Institut (Germany). . . . . [6927-49]

11:35 am: Plastic muscles as lightweight, low-voltage actuators, and sensors, Matthew D. Bennett, Discover Technologies Inc.; Andrew J. Duncan, Donald J. Leo, Virginia Polytechnic Institute and State Univ. . . . . [6927-50]

Lunch Break . . . . . 11:55 to 1:30

SESSION 11

Golden West . Thurs. 9:30 to 10:10 am

Other EAP

Session Chairs: **Jaehwan Kim,** Inha Univ. (South Korea); **Siavouche Nemat-Nasser,** Univ. of California/ San Diego

9:30 am: **Chitosan-cellulose blended electroactive paper actuator**, Jaehwan Kim, Zhijiang Cai, Yi Chen, A. S. Pintar, Inha Univ. (South Korea) . . . . . [6927-51]

9:50 am: **The development of electrically driven mechanochemical actuators that act as artificial muscle**, Lenore Rasmussen, Ras Labs., LLC; Lewis D. Meixler, Princeton Univ.; Don Harper, Kimun Park, TRI/ Princeton . . . . . [6927-52]

Coffee Break. . . . . 10:10 to 10:35 am

Session 14 runs concurrently with session 18.

SESSION 14

Royal Palm V. . . . .Thurs. 9:00 to 10:20 am

Integrated Systems in Bionics and Nature-Inspired Technologies

Session Chairs: **Yuji Matsuzaki,** Nagoya Univ. (Japan); **Ephrahim Garcia,** Cornell Univ.

9:00 am: **Bio-inspired shape memory actuated hexapod robot**, Megan Berry, Ephrahim Garcia, Cornell Univ.. . . . . [6928-68]

9:20 am: **Flapping performance and simulation of an insect-mimicking flapper actuated by a compressed unimorph piezoelectric composite actuator**, Quoc Viet Nguyen, Hoon Cheol Park, Nam Seo Goo, Doyoung Byun, Konkuk Univ. (South Korea) . . . . . [6928-64]

9:40 am: **An aeroelastic analysis of a flexible flapping wing using modified strip theory**, Dae-Kwan Kim, Jun-Seong Lee, Jin-Young Lee, Jae-Hung Han, Korea Advanced Institute of Science and Technology (South Korea) . . . . . [6928-65]

10:00 am: **Numerical analyses of stabilization and control for flapping-wing flight**, Jin-Young Lee, Dae-Kwan Kim, Jun-Seong Lee, Jae-Hung Han, Korea Advanced Institute of Science and Technology (South Korea) . . . . . [6928-66]

Coffee Break. . . . . 10:20 to 10:50 am

SESSION 18

Royal Palm iV . . . .Thurs. 9:10 to 10:10 am

Aircraft and MAV/UAV Systems

Session Chair: **Pablo Bandera,** Honywell

9:10 am: **Investigation of an energy harvesting small unmanned air vehicle**, Kyle C. Magoteaux, Univ. of Dayton and Air Force Research Lab.; Brian P. Sanders, Air Force Research Lab.; Henry A. Sodano, Arizona State Univ.. . . . . [6928-85]

9:30 am: **Vibration energy harvesting for micro air vehicle sensors**, Steven R. Anton, Daniel J. Inman, Virginia Polytechnic Institute and State Univ.[6928-86]

9:50 am: **Analysis of membrane wing for micro air vehicles**, Emily A. Leylek, Justin E. Manzo, Ephrahim Garcia, Cornell Univ. . . . . [6928-87]

Coffee Break. . . . . 10:10 to 10:35 am

SESSION 12

California. . . . . .Thurs. 9:10 to 10:10 am

Magnetic Shape-Memory Alloys I

Session Chairs: **Robert C. O'Handley,** Massachusetts Institute of Technology; **Stefan S. Seelecke,** North Carolina State Univ.

9:10 am: **Magnetic field-induced phase transformation in NiMnGa and NiMnCoIn shape-memory alloys**, Ibrahim Karaman, Haluk E. Karaca, Burak Basaran, Texas A&M Univ. . . . . [6929-58]

9:30 am: **Micromechanical modeling of magnetic shape memory alloy Ni_2MnGa single crystals**, Mourad Elhadrouz, Ecole Nationale Supérieure d'Arts et Métiers (France) . . . . . [6929-95]

9:50 am: **A continuum thermodynamics formulation for micro-magneto-mechanics with applications to ferromagnetic shape-memory alloys**, Chad M. Landis, The Univ. of Texas at Austin . . . . . [6929-60]

Coffee Break. . . . . 10:10 to 10:35 am

Golden West Room

8:00 to 8:05 am: **Announcements and Awards**

8:05 to 8:20 am: **Funding Agency-AFOSR Talk**
Byung-Lip (Les) Lee, Air Force Office of Scientific Research

8:20 to 9:05 am: **Plenary Presentation: European Research Strategy in Aeronautics and Space: Smart Materials and Health Monitoring**
Theodore Marikas, Univ. Ioannina (Greece) and **Vassilis Kostopoulos,** Univ. Patras (Greece)

SESSION 6

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

Nano and Micro Devices for Biosensing II

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

9:10 am: **Implantable wireless microsensors for gastroesophageal reflux disease diagnosis and pain management (Keynote Presentation)**, Jung-Chih Chiao, The Univ. of Texas at Arlington[6931-14]

9:50 am: **Effects of magnetic properties and geometrical structures of magnetic nanotubes on neuron growth**, Linfeng Chen, Jining Xie, Univ. of Arkansas; Malathi Srivatsan, Arkansas State Univ.; Vijay K. Varadan, Univ. of Arkansas . . . . . [6931-15]

Coffee Break. . . . . 10:10 to 10:35 am

Session 22 runs concurrently with session 25.

SESSION 22

**Note Room Change*

Dover. . . . . Thurs. 9:10 to 10:10 am

Energy Harvesting and Storage

Session Chairs: **Jerome Peter Lynch,** Univ. of Michigan; **Ming L. Wang,** Univ. of Illinois at Chicago

9:10 am: ****Anodized aluminum oxide (AAO) based nanowells for hydrogen detection**, Francisco A. Rumiche, Ernesto Indacochea, Alberto Polar, Ming L. Wang, Univ. of Illinois at Chicago; Hau Wang, Argonne National Lab. . . . . [6932-110]

9:30 am: **Multi-objective optimal control of vibratory energy harvesting systems**, Jeffrey T. Scruggs, Duke Univ.. . . . . [6932-111]

9:50 am: ****Enhanced power harvesting using poly(vinylidene fluoride) thin films tuned by carbon nanotube fillers**, Junhee Kim, Kenneth J. Loh, Jerome P. Lynch, Univ. of Michigan . . . . [6932-112]

Coffee Break. . . . . 10:10 to 10:35 am

SESSION 25

Stratford . . . . . .Thurs. 9:30 to 10:10 am

Signal Processing & Damage Detection I

Session Chairs: **Bong-Hwan Koh,** Dongguk Univ. (South Korea); **Fuh-Gwo Yuan,** North Carolina State Univ.

9:30 am: **Identification of structural damage using wavelet-based data classification**, Bong-Hwan Koh, Uk Jung, Dongguk Univ. (South Korea); Min-Joong Jeong, Hyunah Lee, Korea Institute of Science and Technology Information (South Korea)[6932-122]

9:50 am: **Delay of boundary layer separation by means of streamwise line acoustic sources**, Yoshinobu Iwai, Ibaraki Univ. (Japan); Yoshihiro Kikushima, Hiroyuki Abe, National Institute of Advanced Industrial Science and Technology (Japan); Eizi Kato, Ibaraki Univ. (Japan). . . . . [6932-123]

Coffee Break. . . . . 10:10 to 10:35 am

SESSION 5

**Note Room Change*

Sunset . . . . . .Thurs. 9:10 to 10:10 am

Wireless Sensor Networks and Remote Sensing

Session Chair: **Ying Zhang,** Georgia Institute of Technology

9:10 am: **Advances in wireless sensor networks for distributed sensing, controls, and computing**, Jerome P. Lynch, Raymond A. Swartz, Univ. of Michigan. . . . . [6934-31]

9:30 am: **A distant real-time radar NDE technique for the in-depth inspection of glass fiber reinforced polymer-retrofitted concrete columns**, Tzu-Yang Yu, Oral Buyukozturk, Massachusetts Institute of Technology. . . . . [6934-32]

9:50 am: **Passive sensing and imaging for GIS-PMS: system concept and challenges**, Dave Boyajian, The Univ. of North Carolina at Charlotte; Hung-Chi Chung, ImageCat, Inc.; Shenen Chen, The Univ. of North Carolina at Charlotte . . . . . [6934-33]

Coffee Break. . . . . 10:10 to 10:35 am

SESSION 12

Sunrise . . . . . .Thurs. 9:30 to 10:10 am

Signal Processing for SHM

Session Chairs: **Andrei N. Zagrai,** New Mexico Institute of Mining and Technology; **Shivan Haran,** Arkansas State Univ.

9:30 am: **Optimized guided-wave excitations for health monitoring of a bolted joint**, Timothy R. Fasel, Colin C. Olson, Michael D. Todd, Univ. of California/San Diego. . . . . [6935-59]

9:50 am: **Experimental validation of a soft identification algorithm for a MDOF frame structure**, Bin Xu, Ping Lu, Hunan Univ. (China); Gangbing Song, Univ. of Houston . . . . . [6935-60]

Coffee Break. . . . . 10:10 to 10:35 am

SESSION 12

Golden West . . . Thurs. 10:35 am to 12:15 pm

Applications of EAP to Optical Devices

Session Chairs: **Hyouk Ryeol Choi,** Sungkyunkwan Univ. (South Korea); **Iain A. Anderson,** The Univ. of Auckland (New Zealand)

10:35 am: **Smart sunglasses with tuneable shade**, Chao Ma, Minoru Taya, Chunye Xu, Univ. of Washington . . . . . [6927-54]

10:55 am: **Design and position control of AF lens actuator for mobile phone using IPMC EMIM**, Chul-Jin Kim, Sung Joo Kim, No Cheol Park, Hyunseok Yang, Young-Pil Park, Yonsei Univ. (South Korea); Kang-Ho Park, Hyung-Kun Lee, Nak-Jin Choi, Electronics and Telecommunications Research Institute (South Korea) . . . . . [6927-55]

10:35 am: **Fast bender actuators for fish-like aquatic robots**, Geoffrey M. Spinks, Scott T. McGovern, Binbin Xi, Gürsel Alici, Univ. of Wollongong (Australia); Van-Tan Truong, Defence Science and Technology Organisation (Australia); Gordon G. Wallace, Univ. of Wollongong (Australia) . . . . . [6927-91]

11:15 am: **Development of an electroactive polymer actuator based on NBR for micro optical zoom lens**, Baek-Chul Kim, Hyunseok Kim, Huu Chuc Nguyen, M. S. Cho, Y. Lee, Jaedo Nam, Hyouk Ryeol Choi, Sungkyunkwan Univ. (South Korea); H. S. Jeong, SAMSUNG Electro-Mechanics Co., Ltd. (South Korea); Ja Choon Koo, Sungkyunkwan Univ. (South Korea) . . . . . [6927-57]

11:35 am: **Application of ionic polymer-metal composites for auto-focusing compact camera modules**, Hyung-Kun Lee, Nak-Jin Choi, Kang-Ho Park, Sunkyung Jung, Sunyoung Lee, Electronics and Telecommunications Research Institute (South Korea) . . . . . [6927-58]

Lunch Break . . . . . 12:15 to 1:30 pm

Session 15 runs concurrently with session 19.

SESSION 15

Royal Palm V. . . Thurs. 10:50 am to 11:50 pm

Integration of Active/Passive Materials and Devices into Integrated Systems I

Session Chairs: **Mehrdad N. Ghasemi-Nejhad,** Univ. of Hawai'i at Manoa; **Eric H. Anderson,** CSA Engineering, Inc.

10:50 am: **Recent studies of electrostatic variable area actuation of membrane reflectors for beam guidance**, Miles A. Wickersham, Andrew W. Downs, Umesh A. Korde, Mark E. Hofacker, Nicholas R. Kingsbury, South Dakota School of Mines and Technology. . . . . [6928-69]

11:10 am: **Integration, control, and applications of multifunctional smart struts**, Kougen Ma, Mehrdad N. Ghasemi-Nejhad, Univ. of Hawai'i at Manoa. . . . . [6928-70]

11:30 am: **Robust vibration suppression of an adaptive circular composite plate for satellite thrust vector control**, Su Yan, Kougen Ma, Mehrdad N. Ghasemi-Nejhad, Univ. of Hawai'i at Manoa. . . . . [6928-71]

Lunch Break . . . . . 11:50 am to 1:30 pm

SESSION 19

Royal Palm VI . . Thurs. 10:35 am to 11:35 pm

Modeling, Analysis, and Design of Structural Sensing and Actuation in Integrated Systems

Session Chairs: **Samir A. Nayfeh,** Massachusetts Institute of Technology

10:35 am: **Behavior of thin lightweight structures under propagating waves**, Eric A. Petersen, Univ. of Nebraska/Lincoln and South Dakota School of Mines and Technology; Umesh A. Korde, South Dakota School of Mines and Technology. . . . . [6928-89]

10:55 am: **Experimental studies of using wireless energy transmission for powering SHM sensor nodes**, Kevin M. Farinholt, Matthew J. Nothnagel, Gyuhae Park, Charles R. Farrar, Los Alamos National Lab.; David D. L.Mascarenas, Michael D. Todd, Univ. of California/San Diego . . . . . [6928-90]

11:15 am: **Design of dual-stage actuation system for high-precision optical manufacturing**, Jiong Tang, Univ. of Connecticut. . . . . [6928-92]

Lunch Break . . . . . 11:35 am to 1:00 pm

SESSION 13

California. . . Thurs. 10:35 am to 11:55 pm

Magnetic Shape-Memory Alloys II

Session Chairs: **Dimitris C. Lagoudas,** Texas A&M Univ.; **Neelesh N. Sarawate,** The Ohio State Univ.

10:35 am: **Micromagnetic theory of ferromagnetic shape-memory alloys**, JiangYu Li, Univ. of Washington . . . . . [6929-61]

10:55 am: **Energy harvesting using NiMnGa magnetic shape-memory alloys**, Burak Basaran, Haluk E. Karaca, Ibrahim Karaman, Aydin I. Karsilayan, Texas A&M Univ. . . . . [6929-62]

11:15 am: **Dynamic strain-field hysteresis model for ferromagnetic shape-memory Ni-Mn-Ga**, Neelesh N. Sarawate, Marcelo J. Dapino, The Ohio State Univ. . . . . [6929-63]

11:35 am: **Acoustic-assisted, magnetic-field-induced strain and stress output of a Ni-Mn-Ga single crystal**, Ratchatee Techapiesancharoenkij, Massachusetts Institute of Technology; Jari Kostamos, Helsinki Univ. of Technology (Finland); Jesse Simon, Ferro Solutions, Inc.; David Bono, Samuel M. Allen, Robert C. O'Handley, Massachusetts Institute of Technology . . . [6929-64]

Lunch Break . . . . . 11:55 pm to 1:30 am

SESSION 7

Royal Palm III . . Thurs. 10:35 am to 12:15 pm

Nano Biosensors

Session Chairs: **Jose K. Abraham,** Univ. of Arkansas; **Bhanu L. Aryasomayajula,** Univ. of Arkansas

10:35 am: **Feasibility of e-paper made with cellulose** *(Invited Paper)*, Jaehwan Kim, Kiyeon Cho, Kwang Sun Kang, Inha Univ. (South Korea)[6931-16]

11:15 am: **Biomimetic approach to develop electronic sensing cilia for flow velocity sensing in mesoscale vessels**, Hargsoon Yoon, Vasuda Ramachandran, Vijay K. Varadan, Univ. of Arkansas. . . . . [6931-17]

11:35 am: **Ion-sensitive field effect transistors for pH and potassium ion concentration sensing, towards detection of myocardial ischemia**, Pratyush Rai, Soyoun Jung, Taeksoo Ji, Vijay K. Varadan, Univ. of Arkansas . . . . . [6931-18]

11:55 am: **Respiration sensors based on carbon nanotube films**, Jose K. Abraham, Lavanya L. Aryasomayajula, Ashwin K. Whitchurch, Vijay K. Varadan, Univ. of Arkansas . . . . . [6931-19]

Lunch Break . . . . . 12:15 to 1:30 pm

Session 23 runs concurrently with session 26.

SESSION 23

Dover. . . . . Thurs. 10:35 am to 11:55 pm

SHM/Damage Detection Methods I

Session Chairs: **Steven D. Glaser,** Univ. of California/Berkeley; **Akira Mita,** Keio Univ. (Japan)

10:35 am: ****Hybrid structural health monitoring through global sensing and local infrared imaging**, Nebojsa Sebastijanovic, Henry T. Y.Yang, Univ. of California/Santa Barbara; He Qi, Xiaoyan Han, Wayne State Univ. . . . . [6932-113]

10:55 am: ****Structural health monitoring sensor development for the Imote2 platform**, Jennifer A. Rice, Billie F. Spencer, Jr., Univ. of Illinois at Urbana-Champaign. . . . . [6932-114]

11:15 am: **Development of autonomous triggering instrumentation**, Steve E. Watkins, Theresa M. Swift, James W. Fonda, Univ. of Missouri/Rolla [6932-115]

11:35 am: **Acoustic emission monitoring of stay cables in noisy environments**, Ting Jin, Zhi Sun, Limin Sun, Tongji Univ. (China) . . . . . [6932-117]

Lunch Break . . . . . 11:55 am to 1:30 pm

SESSION 26

Stratford . . . Thurs. 10:35 am to 12:15 pm

Signal Processing and Damage Detection II

Session Chairs: **Jiong Tang,** Univ. of Connecticut; **Jin-Song Pei,** Univ. of Oklahoma

10:35 am: ****Enhanced statistical damage identification using frequency change information with tunable piezoelectric circuitry**, Ji Zhao, Jiong Tang, Univ. of Connecticut. . . . . [6932-124]

10:55 am: ****Damage detection using piezoelectric impedance and spectral element method**, Xin Wang, Jiong Tang, Univ. of Connecticut [6932-125]

11:15 am: **An optical fiber sensor for acoustic wave mode decomposition**, Nik Rajic, Claire E. Davis, Cedric Rosalie, Defence Science and Technology Organisation (Australia). . . . . [6932-126]

11:35 am: **Improved IPMC sensing by use of cations and through induced nano-to-micro scale surface cracks**, Rashi Tiwari, Kwang J. Kim, Univ. of Nevada/Reno . . . . . [6932-127]

11:55 am: **Embedded algorithms within an FPGA and microprocessor-based system to process nonlinear time series data for structural health monitoring**, Jonathan D. Jones, Jin-Song Pei, Krisda Piyawat, Monte P. Tull, John K. Antonio, Univ. of Oklahoma . . . . . [6932-128]

Lunch Break . . . . . 12:15 to 1:45 pm

SESSION 6

Sunset . . . . . Thurs. 10:35 am to 12:15 pm

Progess in NDE

Session Chairs: **Jerome Peter Lynch,** Univ. of Michigan; **Hung-Chi Chung,** ImageCat, Inc.

10:35 am: **On the feasibility of energy harvesting for health-monitoring sensors in the transport infrastructures**, Chin-An Tan, Wayne State Univ. . . . . [6934-34]

10:55 am: **Multimode piezoelectric energy harvesters for wireless sensor network-based structural-health monitoring**, Ying Zhang, Georgia Institute of Technology; Wei He, Univ. of California/Berkeley . . . . . [6934-35]

11:15 am: **Monitoring damage propagation using PZT impedance transducers**, Yaowen Yang, Hui Liu, Venu G. M.Annamdas, Nanyang Technological Univ. (Singapore) . . . . . [6934-36]

11:35 am: **Quantitative characterization of materials using flash thermography**, Steven M. Shepard, Yulin Hou, Thermal Wave Imaging, Inc. . . . . [6934-37]

11:55 am: **Quadrangular grid method for stress wave propagation in 2D orthotropic materials**, Dajun Li, Beijing Jiaotong Univ. (China); Tielin Liu, Shenyang Jianzhu Univ. (China). . . . . [6934-38]

Lunch Break . . . . . 12:15 to 1:30 pm

SESSION 13

Sunrise . . . . Thurs. 10:35 am to 12:15 pm

Modeling for SHM Applications II

Session Chairs: **Won-Bae Na,** Pukyong National Univ. (South Korea); **George Zentai,** Varian Medical Systems, Inc.

10:35 am: **Integrated structural health monitoring for composites using proper orthogonal decomposition-based model filter**, Ratneshwar Jha, Conner B. Shane, Clarkson Univ.. . . . [6935-61]

10:55 am: **Multiscale modeling of wave propagation in composite materials with defects**, Whitney D. Reynolds, Aditi Chattopadhyay, Arizona State Univ. . . . . [6935-62]

11:15 am: **Passive damage detection in composite laminates with integrated sensing networks**, Yi Huang, Univ. of California/San Diego. . . . . [6935-63]

11:35 am: **Structural damage detection and estimation by amplitude-frequency modulation analysis**, Perngjin F. Pai, Univ. of Missouri/Columbia . . . . . [6935-64]

11:55 am: **A Dempster-Shafer evidence theory-based approach for on-line structural health monitoring**, Yuequan Bao, Hui Li, Jinping Ou, Harbin Institute of Technology (China). . . . . [6935-65]

Lunch Break . . . . . 12:15 to 1:50 pm

SESSION 13

San Diego . . . . . .Thurs. 1:30 to 3:10 pm

Applications of EAP to Actuation and Transduction

Session Chairs: **Siegfried Bauer,** Johannes Kepler Univ. Linz (Austria); **Qibing Pei,** Univ. of California/Los Angeles

1:30 pm: **Mechanical cell stimulation with dielectric elastomer actuators**, Manuel Aschwanden, Raoul Enning, Andreas Vonderheit, Antje Rey, Andreas Stemmer, ETH Zürich (Switzerland). . . . . [6927-59]

1:50 pm: **Even larger deformations of dielectric elastomer membranes through specialized dynamic actuation**, Nakhiah C. S.Goulbourne, Jason W. Fox, Virginia Polytechnic Institute and State Univ.. . . . . [6927-60]

2:10 pm: **Effects of polymer topology on electromechanical performance of novel ionic polymer transducers**, Andrew J. Duncan, Donald J. Leo, Timothy E. Long, Virginia Polytechnic Institute and State Univ.; Barbar J. Akle, Lebanese American Univ. (Lebanon); Matthew D. Bennett, Discover Technologies Inc.; Frederick L. Beyer, Army Research Lab.; Ralph H. Colby, The Pennsylvania State Univ.. . . . . [6927-61]

2:30 pm: **Multistacked actuator based on synthetic elastomer: optimal design and control**, Hyouk Ryeol Choi, Sungkyunkwan Univ. (South Korea). . . . . [6927-63]

2:50 pm: **Inflated dielectric EAP actuator for eyeball's movements: fabrication, analysis, and experiments**, Yanju Liu, Liang Shi, Zhen Zhang, Harbin Institute of Technology (China). . . . [6927-65]

■ **Conference End**

Session 16 runs concurrently with session 20.

SESSION 16

Royal Palm V. . . . . Thurs. 1:30 to 3:10 pm

Integration of Active/Passive Materials and Devices into Integrated Systems II

Session Chairs: **Mehrdad N. Ghasemi-Nejhad,** Univ. of Hawai'i at Manoa; **Mohammad A. Rastgaar,** Virginia Polytechnic Institute and State Univ.

1:30 pm: **An investigation into active piezoelectric nanocomposites for distributed energy harvesting**, Joel Feenstra, Michigan Technological Univ.; Henry A. Sodano, Arizona State Univ. . . . . [6928-72]

1:50 pm: **Rectifier-less piezoelectric micro power generator**, Arman Hajati, Massachusetts Institute of Technology . . . . . [6928-73]

2:10 pm: **Performance characteristics of a high-frequency jetting dispenser featuring piezoelectric actuator**, Bo-Young Yun, Quoc-Hung Nguyen, Seung-Min Hong, Seung-Bok Choi, Inha Univ. (South Korea). . . . . [6928-74]

2:30 pm: **A blended polymer electret-based micro-electrostatic power generator**, Chih-Kung Lee, Wen-Ching Ko, Bor-Shiun Lee, Jia-Lun Chen, Shun-Chi Lin, Wen-Jong Wu, National Taiwan Univ. (Taiwan) . . [6928-75]

2:50 pm: **Piezoelectric control of nonlinear moal interaction in stiffened structures**, Srinivasan Sridharan, Sunjung Kim, Washington Univ. in St. Louis . . . . . [6928-76]

Coffee Break. . . . . 3:10 to 3:40 pm

SESSION 20

Royal Palm IV . . . . . Thurs. 1:00 to 2:20 pm

Morphing Structures and Aircrafts

Session Chairs: **Roger Stanway,** The Univ. of Sheffield (United Kingdom)

1:00 pm: **Bistable mechanisms for morphing rotors**, Terrence E. Johnson, Farhan Gandhi, Mary I. Frecker, The Pennsylvania State Univ. . . . . [6928-94]

1:20 pm: **Shape control of a morphing structure (rotor blade) using a shape memory alloy actuator system, future of SMA**, Glenn S. Bushnell, Darin J. Arbogast, Robert T. Ruggeri, The Boeing Co.. . . . . [6928-95]

1:40 pm: **Prediction of aircraft dynamics and control with shape changing wings**, Edgar A. Cuji, Ephrahim Garcia, Cornell Univ.. . . . . [6928-96]

2:00 pm: **Shape control of a piezo-activated beam model with application to a class of morphing air vehicles**, Edward C. Diggs, Virginia Polytechnic Institute and State Univ.[6928-97]

Session 17 runs concurrently with session 21.

SESSION 17

Royal Palm V. . . . . Thurs. 3:40 to 5:40 pm

Active/Semi-Active/Passive Vibration Control

Session Chairs: **Joseph R. Maly,** CSA Engineering, Inc.; **Nakhiah C. S. Goulbourne,** Virginia Polytechnic Institute and State Univ.

3:40 pm: **Experimental assessment of negative impedance shunts for vibration suppression on a beam**, Benjamin S. Beck, Kenneth A. Cunefare, Georgia Institute of Technology; Manuel Collet, Univ. de Franche-Comté (France). . . . . [6928-78]

4:00 pm: **Structural vibration control with semi-active variable stiffness TLCD**, Linsheng Huo, Hong-Nan Li, Dalian Univ. of Technology (China) . . . . . [6928-79]

4:20 pm: **Several topics from active vibration control technique using piezoelectric films**, Tsutomu Nishigaki, Kinki Univ. (Japan). . . . . [6928-80]

4:40 pm: **Active damping control of micromachined devices in a low-atmospheric pressure environment**, Robert N. Dean, Jr., George T. Flowers, Chen Chen, Seong J. Kim, Auburn Univ.. . . . . [6928-81]

5:00 pm: **Frequency response analysis of vibration system with parametric excitation of damping coefficient**, Daisuke Iba, Arata Masuda, Akira Sone, Kyoto Institute of Technology (Japan) . . . . . [6928-82]

5:20 pm: **Recent studies of electronic tuning of out of plane stiffness and dissipation of piezoelectric polymer membranes**, Miles A. Wickersham, Travis J. Zelfer, Umesh A. Korde, Eric A. Petersen, South Dakota School of Mines and Technology . . . . . [6928-83]

SESSION 21

Royal Palm IV . . . . . Thurs. 2:20 to 3:20 pm

Flexible Robotic Systems

Session Chairs: **Mohammad A. Rastgaar,** Virginia Polytechnic Institute and State Univ.

2:20 pm: **Vibration suppression of a flexible manipulator using self-tuning optimal control and LIPCA actuator**, Van Phuoc Phan, Hoon Cheol Park, Nam Seo Goo, Konkuk Univ. (South Korea) . . . . . [6928-98]

2:40 pm: **Numerical analysis of deformation of a beam with thin piezoelectric actuators partially debonded and buckling**, Tadashige Ikeda, Nagoya Univ. (Japan); Samikkannu Raja, National Aerospace Labs. (India); Tetsuhiko Ueda, Nagoya Univ. (Japan). . . . . [6928-99]

3:00 pm: **Shape memory alloy wire actuated robot squid with flexible fins**, Zhenlong Wang, Guanrong Hang, Yangwei Wang, Li Jian, Harbin Institute of Technology (China) . . . . . [6928-100]

■ **Conference End**

SESSION 14

California. . . . . .Thurs. 1:30 to 3:10 pm

Magnetostrictive Materials I

Session Chairs: **Eric M. Summers,** ETREMA Products, Inc.; **Bjoern Kiefer,** Univ. Stuttgart (Germany)

1:30 pm: **Effects of aluminum additions in polycrystalline iron-gallium (Galfenol) alloys**, Michael D. Brooks, Eric M. Summers, Jerry Mosley, Rob Meloy, ETREMA Products, Inc. . . . . [6929-66]

1:50 pm: **Elastic properties and auxetic behavior of Galfenol for a range of compositions**, Holly Schurter, Alison B. Flatau, Univ. of Maryland/College Park . . . . . [6929-67]

2:10 pm: **Miniature spherical motor using iron-gallium alloy (Galfenol)**, Toshiyuki Ueno, The Univ. of Tokyo (Japan); Chihiro Saito, Nobuo Imaizumi, Namiki Precision Jewel Co., Ltd. (Japan); Toshiro Higuchi, The Univ. of Tokyo (Japan) . . . . . [6929-68]

2:30 pm: **Fully coupled magnetoelastic model for Galfenol alloys incorporating eddy-current losses and thermal relaxation**, Phillip G. Evans, Marcelo J. Dapino, The Ohio State Univ.. . . . . [6929-69]

2:50 pm: **Equivalence of magnetoelastic and elastic energies with stress-induced anisotropy and its use in the Armstrong model for magnetostriction**, Chaitanya Mudivarthi, Supratik Datta, Univ. of Maryland/College Park; Jayasimha Atulasimha, North Carolina State Univ. (Canada); Alison B. Flatau, Univ. of Maryland/College Park; Phillip G. Evans, Marcelo J. Dapino, The Ohio State Univ. . . . . [6929-98]

Coffee Break. . . . . 3:10 to 3:40 pm

SESSION 8

Royal Palm III . . . . . .Thurs. 1:30 to 2:50 pm

Systems Application

Session Chairs: **Hargsoon Yoon,** Univ. of Arkansas; **Kyo D. Song,** Norfolk State Univ.

1:30 pm: **Development of a high-performance peristaltic micropump**, My Pham, Nam Seo Goo, Konkuk Univ. (South Korea) . . . . . [6931-20]

1:50 pm: **Study on microwave power via rectenna for airship application**, Kyo D. Song, Norfolk State Univ. . . . . [6931-21]

2:10 pm: **2D fiberoptic scanning microdisplay system**, Wei-Chih Wang, Univ. of Washington . . . . . [6931-22]

2:30 pm: **Millimeter wave identification: concept, applications, and demonstrations**, Tauno Vähä-Heikkilä, Pekka Pursula, VTT Technical Research Ctr. of Finland (Finland); Alexandru Muller, Dan Neculoiu, IMT-Bucharest (Romania); Jussi Tuovinen, VTT Technical Research Ctr. of Finland (Finland)[6931-23]

2:50 pm: **MEMS-based liquid lens for capsule endoscope**, S. W. Seo, BNP Science Co., Ltd. (South Korea); S. Han, Hoseo Univ. (South Korea); J. H. Seo, Y. M. Kim, M. S. Kang, N. G. Min, Korea Univ. (South Korea); W. B. Choi, BNP Science Co., Ltd. (South Korea); M. Y. Sung, Korea Univ. (South Korea) . . . . . [6931-27]

■ **Conference End**

Session 24 runs concurrently with session 27.

SESSION 24

Dover . . . . . .Thurs. 1:30 to 3:10 pm

SHM/Damage Detection Methods II

Session Chairs: **Henry T. Y. Yang,** Univ. of California/Santa Barbara; **Dong-Jin Yoon,** Korea Research Institute of Standards and Science (South Korea)

1:30 pm: **A novel fiber optic acoustic emission sensor**, Rongsheng Chen, The Univ. of Birmingham (United Kingdom); Pete Theobald, National Physical Lab. (United Kingdom); Michael Gower, National Physical Lab.; Shoaib A. Malik, Jonathan Burns, The Univ. of Birmingham (United Kingdom); Eva Fernandes, Graham Bryce, Doosan Babcock Energy Ltd.; Gerard F. Fernando, The Univ. of Birmingham (United Kingdom) . . . . . [6932-118]

1:50 pm: **A hybrid wireless sensor network for acoustic emission testing in SHM**, Christian U. Grosse, Markus Krueger, Univ. Stuttgart (Germany) . . . . . [6932-137]

2:10 pm: ****Acoustic emission beamforming for enhanced damage detection**, Gregory C. McLaskey, Steven D. Glaser, Univ. of California/ Berkeley; Christian U. Grosse, Univ. Stuttgart (Germany) . . . . . [6932-119]

2:30 pm: **Smart acoustic emission system for wireless monitoring of concrete structures**, Dong-Jin Yoon, Chi-Yeop Kim, Dae-Cheol Seo, Korea Research Institute of Standards and Science (South Korea) . . . . . [6932-120]

2:50 pm: **Surface wave propagation in concrete structures by using piezoelectric actuators/ sensors,** G. L. Huang, F. Song, J. Kim, Univ. of Arkansas at Little Rock. . . . . [6932-158]

Coffee Break. . . . . .3:10 to 3:40 pm

SESSION 27

Stratford . . . . . .Thurs. 1:45 to 3:10 pm

Modeling and Design of Smart Systems II

Session Chairs: **H. Harry Asada,** Massachusetts Institute of Technology; **W. Steve Shepard, Jr.,** The Univ. of Alabama at Tuscaloosa

1:45 pm: **A study on smart-materials-based structural health monitoring**, Thatipamula Radhika, Annamdas K. Harish, Jawaharlal Nehru Technological Univ. (India); Venu G. M.Annamdas, Nanyang Technological Univ. (Singapore). . . . . [6932-130]

2:05 pm: ****Structural configuration study for an acoustic wave sensor**, W. Steve Shepard, Jr., Biaobiao Zhang, The Univ. of Alabama; Chuan-Chiang Chen, Tuskegee Univ. . . . . [6932-131]

2:25 pm: **Static analysis of an artificial muscle system based on PZT strain amplification**, Thomas W. Secord, Massachusetts Institute of Technology; Jun Ueda, Massachusetts Institute of Technology and Nara Institute of Science and Technology (Japan); H. Harry Asada, Massachusetts Institute of Technology. . . . . [6932-132]

2:45 pm: **Finite element modeling of fiber Bragg grating strain sensors and experimental validation**, Shoaib A. Malik, Gerard F. Fernando, David Collins, Liwei Wang, Venkata Machavaram, The Univ. of Birmingham (United Kingdom) . . [6932-133]

Coffee Break. . . . . .3:05 to 3:40 pm

SESSION 7

Sunset . . . . . .Thurs. 1:30 to 3:10 pm

Homeland Security Applications

Session Chairs: **Kurt L. Silvers,** Pacific Northwest National Lab.; **Juan D. Valencia,** Pacific Northwest National Lab.

1:30 pm: **Through-container measurement of acoustic signatures for classification/ discrimination of liquid explosives (LEs) and precursor threat liquids**, Aaron A. Diaz, Todd J. Samuel, Brian J. Tucker, Juan D. Valencia, Kevin L. Gervais, Jason S. Thompson, Pacific Northwest National Lab. . . . . [6934-39]

1:50 pm: **Enhanced measurement functionality and signal quality through advanced diplexer design for pulse compression acoustics**, Aaron A. Diaz, Juan D. Valencia, Brian J. Tucker, Pacific Northwest National Lab. . . . . [6934-40]

2:10 pm: **Contraband detection using acoustic technology**, Robert George, Ron Gauthier, Space and Naval Warfare Systems Ctr., San Diego; Aaron A. Diaz, Pacific Northwest National Lab. and Dept. of Energy, National Security Directorate; Kayte Denslow, Tony Cinson, Pacific Northwest National Lab.; Molly Griffin, Spearhead Innovations and MGB, Ltd. . . . . [6934-41]

2:30 pm: **Structure-health assessment and warning system (SHAWS)**, Daniel M. Bock, Keehoon Kim, Physical Optics Corp. . . . . [6934-42]

2:50 pm: **Health monitoring: asset damage detection**, Fred J. Mauss, Brian K. Hatchell, James R. Skorpik, Kurt L. Silvers, Pacific Northwest National Lab. . . . . [6934-43]

Coffee Break. . . . . .3:10 to 3:40 pm

SESSION 14

Sunrise . . . . . .Thurs. 1:50 to 3:10 pm

Novel Instrumentation and Sensing for SHM II

Session Chairs: **George Zentai,** Varian Medical Systems, Inc.; **Olivier Giraudo,** ONERA (France)

1:50 pm: **Comparative evaluation of ultrasonic lenses and electric point contacts for acoustic flux imaging in piezoelectric single crystals**, Evgeny Twerdowski, Univ. Leipzig (Germany); Mieczyslaw Pluta, Politechnika Wroclawska (Poland); Reinhold Wannemacher, Wolfgang Grill, Univ. Leipzig (Germany) . . . . . [6935-66]

2:10 pm: **An offset multilayered optic sensor for shear and pressure measurement**, Chao-Shih Liu, Chung Cheng Institute of Technology (Taiwan); Wei-Chih Wang, Univ. of Washington . . . . . [6935-77]

2:30 pm: **Evaluation of coupled piezoelectric and electromagnetic technique versus stand alone techniques**, Vinod R. Challa, Marehalli Prasad, Frank T. Fisher, Stevens Institute of Technology [6935-68]

2:50 pm: **Effects of solvent vapor pressure and spin-coating speed on morphology of thin polymer blend films**, Albert Kamanyi, Jr., Univ. Leipzig (Germany); Wilfred Ngwa, Univ. of Central Florida; Wolfgang Grill, Univ. Leipzig (Germany) . . . . . [6935-70]

Coffee Break. . . . . .3:10 to 3:40 pm

SESSION 15

California. . . . . .Thurs. 3:40 to 6:00 pm

Magnetostrictive Materials II

Session Chairs: **James B. Restorff,** Naval Surface Warfare Ctr.; **Phillip G. Evans,** The Ohio State Univ.

3:40 pm: **The performance improvement of Galfenol laminated rod with stress annealing**, Jin-Hyeong Yoo, Univ. of Maryland/College Park; James B. Restorff, Marilyn Wun-Fogle, Naval Surface Warfare Ctr.; Alison B. Flatau, Univ. of Maryland/College Park. . . . . [6929-70]

4:00 pm: **Magnetomechanical coupling factor and energy density of single-crystal iron-gallium alloys**, Supratik Datta, Alison B. Flatau, Univ. of Maryland/College Park. . . . . [6929-71]

4:20 pm: **Modeling and computational analysis of materials exhibiting intrinsic magnetomechanical coupling at finite strains**, Bjoern Kiefer, Daniele Rosato, Christian Miehe, Univ. Stuttgart (Germany). . . . . [6929-72]

4:40 pm: **Translatory and wobbling magnetostrictive actuator**, Chihiro Saito, Namiki Precision Jewel Co., Ltd. (Japan); Toshiyuki Ueno, Toshiro Higuchi, The Univ. of Tokyo (Japan); Nobuo Imaizumi, Namiki Precision Jewel Co., Ltd. (Japan) . . . . . [6929-73]

5:00 pm: **Fully coupled model for the direct and inverse effects in cubic magnetostrictive materials**, Phillip G. Evans, Marcelo J. Dapino, The Ohio State Univ. . . . . [6929-74]

5:20 pm: **Coupling effects of finite magneto-electric laminate composites**, Chia-Ming Chang, Gregory P. Carman, Univ. of California/Los Angeles. . . . . [6929-75]

5:40 pm: **Predicting relationship between magnetostriction and applied field of magnetostrictive composites**, Xinchun Guan, Xufeng Dong, Harbin Institute of Technology (China); Jinping Ou, Harbin Institute of Technology (China) and Dalian Univ. of Technology (China) . . . [6929-76]

■ **Conference End**

SESSION 28

Dover. . . . . .Thurs. 3:40 to 5:20 pm

Wireless for SHM

Session Chair: **Gyuhae Park,** Los Alamos National Lab.

3:40 pm: **Development of wireless carbon nanotube/nanofiber-based sensor for health monitoring of composite structures**, Whitney T. Moore, Norfolk State Univ.; Karl Hansen, The Univ. of Tennessee at Martin; Domonique Bradford, Mohamed Saafi, Alabama A&M Univ. . . . [6932-135]

4:00 pm: **Experimental investigations of wireless active-sensor nodes using impedance-based structural health monitoring**, Gyuhae Park, Timothy G. Overly, Kevin Farinholt, Charles R. Farrar, Los Alamos National Lab.; David D. L.Mascarenas, Michael D. Todd, Univ. of California/San Diego . . . . . [6932-136]

4:20 pm: **Design and implementation of a wireless sensor network for smart living spaces**, Wen-Jong Wu, C. S. Yeh, C. K. Lee, J. D. Huang, National Taiwan Univ. (Taiwan). . . . . [6932-138]

4:40 pm: **Two degree of freedom energy harvesting device with a variable stiffness for resonance frequency tuning**, Vinod R. Challa, Marehalli Prasad, Frank T. Fisher, Stevens Institute of Technology. . . . . [6932-139]

5:00 pm: **A wireless bonded patch repair monitoring approach**, Nezih Mrad, Defence Research and Development Canada (Canada). . . . . [6932-141]

■ **Conference End**

SESSION 8

Sunset. . . . . .Thurs. 3:40 to 6:00 pm

Detection in Structural and Mechanical Systems

Session Chairs: **Brian J. Tucker,** Pacific Northwest National Lab.; **Shawn J. Beard,** Acellent Technologies, Inc.

3:40 pm: **Damping performance of colloidal dampers**, Gangyi Zhou, Univ. of California/Irvine; Bryan Johnson, Honda R&D Americas, Inc.; Lizhi Sun, Univ. of California/Irvine. . . . . [6934-44]

4:00 pm: **Through-wall detection and location using ultra-wideband technology**, Xiaoyang Huang, Zhanxiong Wei, Stevens Institute of Technology; Ke Wang, Monterey Bay Aquarium Research Institute; Hong-Liang Cui, Robert A. Pastore, Stevens Institute of Technology. . . . . [6934-45]

4:20 pm: **Design and application of an interdigitated PVDF transducer**, Hua Gu, Univ. of Illinois at Chicago . . . . . [6934-46]

4:40 pm: **Use of impedance measurements for crack detection in moderately soft piezoelectric ceramics**, Steve H. Ferguson, Hubert W. King, Univ. of Victoria (Canada); Nezih Mrad, Ministry of National Defence (Canada); Niru Somayajula, Gopal Gokeda, Richard Blacow, Eswar Prasad, Sensor Technology, Ltd. (Canada) . . . . . [6934-47]

5:00 pm: **A multifeatured hardware platform for SHM**, David C. Zhang, Shawn J. Beard, Bao Liu, Xinlin P. Qing, Amrita Kumar, Lien Ouyang, Acellent Technologies, Inc. . . . . [6934-48]

5:20 pm: **Experimental study on decision fusion of many damage-detection methods with multiresolution**, Yong Chen, Sen-Yuan Tian, Bingnan Sun, Xiao-yan Sun, Zhejiang Univ. (China); Dryver R. Huston, Univ. of Vermont . . . . . [6934-49]

5:40 pm: **Stochastic subspace-based damage localization: application to the ASCE benchmark structure**, Wensong Zhou, Harbin Institute of Technology (China); Laurent Mevel, Institut de Recherche en Informatique et Systèmes (France). . . . . [6934-50]

■ **Conference End**

SESSION 15

Sunrise . . . . . .Thurs. 3:40 to 6:00 pm

Biological and Medical Applications

Session Chairs: **Wei-Chih Wang,** Univ. of Washington; **Paul D. Panetta,** Luna Innovations Inc.

3:40 pm: **High-energy (MeV) x-ray imaging with a mercuric iodide imager**, George Zentai, Larry D. Partain, Varian Medical Systems, Inc. . . . . [6935-71]

4:00 pm: **Determination of mechanical properties with vector-contrast scanning acoustic**, Ahmed M. Esam, Albert Kamanyi, Jr., Moritz von Buttlar, Reinhold Wannemacher, Kristian Hillman, Wolfgang Grill, Univ. Leipzig (Germany). . . . . [6935-72]

4:20 pm: **Identification of aortic-to-upper limb cardiovascular dynamics for aortic blood pressure recovery**, Jin-Oh Hahn, H. Harry Asada, Massachusetts Institute of Technology; Andrew T. Reisner, Massachusetts General Hospital [6935-73]

4:40 pm: **Combined phase-sensitive acoustic microscopy and electric monitoring of rat heart muscle living cells**, Evgeny Twerdowski, Moritz von Buttlar, Randy Kurz, Reinhold Wannemacher, Andrea Robitzki, Wolfgang Grill, Univ. Leipzig (Germany). . . . . [6935-74]

5:00 pm: **Advanced shape tracking to improve flexible endoscopic diagnostics**, Caroline G. L.Cao, Tufts Univ.; Lothar D. Lilge, Princess Margaret Hospital (Canada); Peter Y. Wong, Hua Xing, Nate Zamarripa, Tufts Univ. . . . . [6935-75]

5:20 pm: **High-speed ultrasound monitoring in the field of sports biomechanics**, Muhammad Zakir Hossain, Yeshwant K. Verma, Evgeny Twerdowski, Wolfgang Grill, Univ. Leipzig (Germany). . . [6935-76]

5:40 pm: **On normal modes of vibrations of the fiber partially immersed in fluid**, Wei-Chih Wang, Univ. of Washington. . . . . [6935-67]

■ **Conference End**

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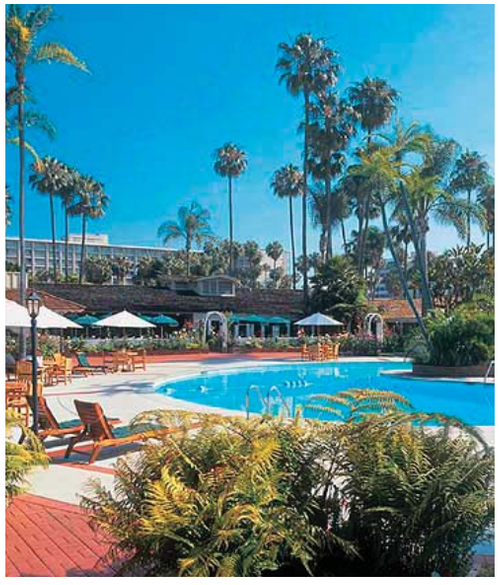

SPIE Smart Structures/NDE

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

Registration

Onsite Registration Hours

Town and Country Resort & Convention Center

Atlas Foyer

Sunday 9 March . . . . . 7:30 am to 4:00 pm
Monday 10 March . . . . . 7:00 am to 5:15 pm
Tuesday 11 March. . . . . 7:00 am to 4:00 pm, 5:30 to 7:00 pm
Wednesday 12 March . . . . . 7:30 am to 4:00 pm
Thursday 13 March . . . . . 7:30 am to 11:00 am

Exhibit Hours

Town and Country Room/Atlas Ballroom

Tuesday 11 March . . . . . 10:00 am to 4:00 pm
Poster reception . . . . . 6:00 pm to 7:30 pm
Wednesday 12 March . . . . . 10:00 am to 4:00 pm

See page 11 for Exhibition details.

Admission to the Exhibition

Admission is included in your conference, course or workshop fees. Or register to attend only the exhibition. Use the exhibit visitor registration form to register to attend the Smart Structures/NDE 2008 Exhibition. Exhibit visitor registration is complimentary.

SPIE Membership

SPIE members receive discounts on conference and course registration fees.

Add Digital Library subscriptions.

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Proceedings and CD-ROMs as part of a registration include tax and shipping. Proceedings and CD-ROM's 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

Atlas Foyer

Sunday through Wednesday . . . . . 7:00 am to 9:00 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 per each person's internet session.

Wireless Internet Access (Wi-Fi)

Guest rooms at The San Diego Town and Country Resort & Convention Center are equipped with high speed wireless Internet, available at a special discounted rate of $4.95 for 24 hours for attendees to the Smart Structures/NDE Symposium. 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 discounted rate. You will need a credit card for this access. 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 short course, workshop, 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

Atlas 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

Atlas Foyer

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

SPIE Marketplace & Membership Services

Atlas Foyer

The SPIE Marketplace is your source for the latest SPIE Press books, Proceedings, and Educational and Professional Development materials.

Food and Beverage Services

Coffee Breaks

Atlas Foyer
Sunday, Monday and Thursday

Town and Country Room
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

Lion Fountain Court

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

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

Desserts

Town and Country Room

Tuesday and Wednesday . . . . . 3:00 to 3:30 pm

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

Business Services

Business Center

Atlas 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 on site.

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

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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.

No Suitcasing Policy

Suitcasing is the act of soliciting business in the aisles during the exhibition or in other public spaces, including another company's booth or a hotel lobby.

Please note that while all meeting attendees are invited to the exhibition, any attendee who is observed to be soliciting business in the aisles or other public spaces, in another company's booth, or in violation of any portion of SPIE Exhibition Policy will be asked to leave immediately. Additional penalties may be applied. Please report any violations you may observe to show management.

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 on-site in the main lobby. The hotel will also provide a special Concierge Services desk near SPIE registration for the convenience of SPIE's 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.

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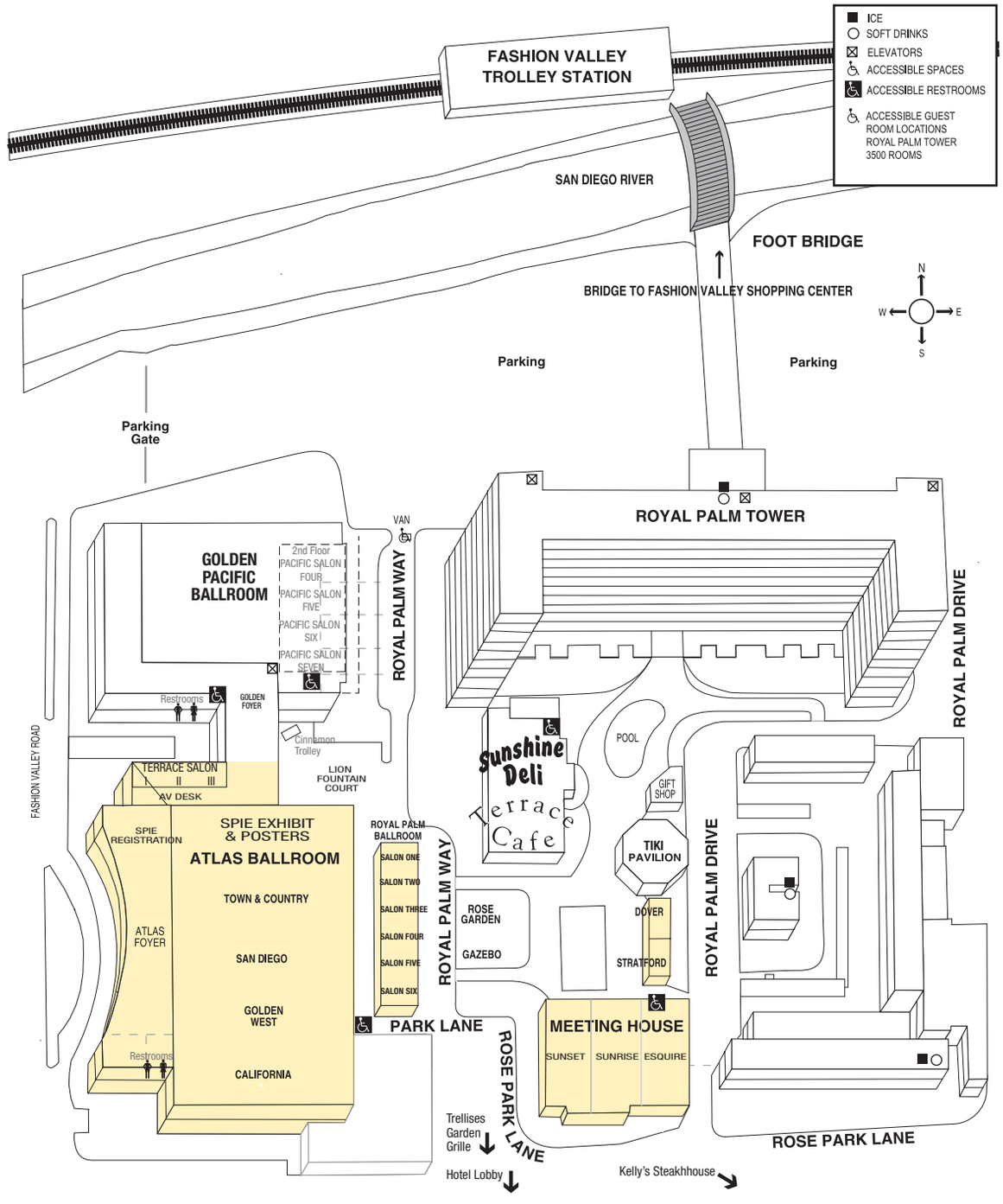
Situated on 22 acres of parkland at the water's edge, over 60 shops, galleries, and boutiques along with restaurants are found in this unique village.



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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 $14 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.

Cloud 9 Shuttle

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. Information and reservations online are available at. Cash and credit cards accepted - no checks. To cancel a reservation, you must call Cloud9 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.

San Diego Trolley/Light Rail

(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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