

ADVANCED ENERGY SYSTEMS DIVISION

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FALL 2006

CHAIR'S MESSAGE *Dr. Muhammad M. Rahman*



It is an honor to serve as the Chair of the Advanced Energy Systems Division and to write this message to all dedicated members of the division. I would

like to thank all of you who have an interest in the Advanced Energy Systems Division. Without your active participation, we could not sustain our activities. The division is in great shape due to the tireless efforts of the committee members and chairs and numerous other volunteers. I would like to thank our past chair Srinivas Garimella for his very active participation in all areas of division activities and his leadership to bring the division to the current state. I would also like to thank Hameed Metghalchi, Sriram

Somasundaram, S.A. Sherif, Salvador Aceves, and other distinguished and dedicated engineers that have led our division in the past.

I am pleased to welcome two new members, Laura Schaefer and Michael Ellis, to the Executive Committee. Laura Schaefer has contributed tremendously to the division as Newsletter Editor and Media Coordinator in addition to serving as the Chair of the Heat Pump Technical Committee. Michael Ellis has led the activities of our Systems Analysis and Fuel Cells Technical Committee.

The Advanced Energy Systems Division will play an important role within ASME in addressing energy sustainability issues that are critical to the future developments of our nation. In cooperation with the Solar Energy Division, the division is organizing a conference on Energy Sustainability (ES 2007) in June 2007 in Long Beach, California. The division is also col-

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laborating with the Heat Transfer and Fluid Engineering Divisions for a Summer Conference in 2008. These activities will complement our usual activities at IMECE to address growing research and developments in the area of energy.

I would welcome input from all of you on our activities and particularly your suggestions on how we can serve you better. It is your involvement and participation that matters the most. Please do not hesitate to call or email me if I can be of any help. ❖

AESD DIVISION AWARDS AND KEYNOTE LECTURE

The AES Division recognizes the contributions of its members and researchers and educators in Advanced Energy Systems at the annual AESD Luncheon at the IMECE. The contributions of these individuals are truly outstanding and are one of the main reasons for the continued advancement of energy related technology. The Awards Luncheon also offers the opportunity for attendees to hear from a leading expert on issues at the forefront of such research and technology.

At the 2005 IMECE, Dr. Rama Venkatasubramanian of Nextreme Thermal Solutions and RTI International provided the featured presentation at

the luncheon on "Recent Advances in Thermoelectric Materials and Energy Technologies." Dr. Venkatasubramanian received his Ph.D. from Rensselaer Polytechnic Institute in the late 1980s and shortly thereafter began working on improving the state of the art in thermoelectrics at RTI International. He has developed a thin-film thermoelectric material that is a poor thermal conductor and strong electrical conductor, an important combination for advancing the field. He is a recipient of RTI's Margaret Knox Excellence Award in Research, the R&D 100 Award, and the Eastern North Carolina IEEE Inventor of the Year.

The 2006 AESD luncheon will be held on Tuesday, November 7, at the IMECE. Tickets to the luncheon are available for advance purchase with conference registration. The speaker for the 2006 luncheon will be Amir Faghri, the United Technologies Chaired Professor in Thermal-Fluids Engineering in the Department of Mechanical Engineering at the University of Connecticut. Dr. Faghri will speak on "Advances in micro/minature energy and passive thermal devices: heat pipes and fuel cells." Dr. Faghri was formerly the Dean of the School of Engineering at Connecticut from 1998-2006.

NEW EXECUTIVE COMMITTEE MEMBERS



Dr. Michael Ellis is one of the new Executive Committee members of the AESD. Dr. Ellis holds a B.S. degree in Mechanical Engineering from the University of

Tennessee and M.S. and Ph.D. degrees in Mechanical Engineering from Georgia Tech. He is currently as Associate Professor of Mechanical Engineering at Virginia Tech. Dr. Ellis has 20 years of experience in engineering, research, and education related to the development and application of advanced energy systems. His current research includes development and evaluation of materials for polymer electrolyte membrane (PEM) fuel cells, investigation of novel PEM fuel cell manufacturing processes, development of physics based models of fuel cell performance, and investigation of alternative energy systems for buildings. Dr. Ellis has a strong commitment to teaching and in 2003 received the Virginia Tech College of Engineering *Dean's Award for Excellence in Teaching*. He also received, along with a team of faculty from the College of Architecture and Urban Studies, the University's

prestigious *Excaliber Award for Teaching*, for his work with Virginia Tech's entry in the national Solar Decathlon competition. He currently teaches undergraduate and graduate courses in thermodynamics, fuel cell systems, hydrogen energy systems, and mechanical systems design. Dr. Ellis is currently the chair of the Systems Analysis and Fuel Cell Group of ASME's Advanced Energy Systems Division and is the director of the Energy Systems Laboratory in the Mechanical Engineering Department at Virginia Tech.



Dr. Laura Schaefer is another new member of the AESD Executive Committee. She is an Associate Professor in the Department of Mechanical

Engineering at the University of Pittsburgh and also serves as Deputy Director of the Mascaro Sustainability Initiative. She holds a B.A. in English and a B.S. in Mechanical Engineering from Rice University, and she received both her M.S. and Ph.D. degrees from the Georgia Institute of Technology in 1997 and 2000, respectively. At Georgia

Tech, she performed research on alternative (non-CFC) refrigerant mixtures, the environmental impact of heat pumps, and an absorption cycle invented by Albert Einstein and Leo Szilard. At Pitt, Dr. Schaefer pursues energy systems research that has both interesting theoretical aspects and important practical applications. To that end, her research approach has been to examine energy systems both from a fundamentals viewpoint and in a societal/environmental context. She conducts research in areas such as flat-tube solid oxide fuel cell heat and mass transfer modeling, two-phase binary zeotropic flow in microchannels, thermoacoustics, microscale PEM fuel cell heat and water management issues, and advanced turbine cycle power generation analysis and optimization. Dr. Schaefer recently was selected to receive a CAREER Award from NSF and the New Investigator Award from the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE). She was elected to the Faculty Honor Roll for the Department of Mechanical Engineering, and serves as the faculty advisor for the Pitt student chapter of ASME. ❖

AESD DIVISION AWARDS AND KEYNOTE LECTURE – *Continued From Page 1*

Dr. Faghri has received many honors and awards, including the prestigious 1998 American Institute of Aeronautics & Astronautics (AIAA) Thermophysics Award, the 1998 American Society of Mechanical Engineering (ASME) Heat Transfer Memorial Award and the 2005 ASME James Harry Potter Gold Medal.

Over the past year, the Systems Analysis and Fuel Cells Technical Committee has chosen two papers from 2005 for their *Best Paper Award* and *Best Student Paper Award*. The *Best Paper Award* was presented to Diego Rancruel and Michael von Spakovsky of Virginia Tech for "Development and application of a dynamic decomposition strategy for the optimal synthesis/design and operational/control of a SOFC based APU under transient conditions." The *Best Student Paper Award* winner was Cullen Buie of Stanford for "Active water management

for proton exchange membrane fuel cells using an integrated electro-osmotic pump," which was co-authored by J. Posner, T. Fabian, S.-W. Cha, F. Prinz, J. Eaton, and J. Santiago

At the 2006 IMECE, the Heat Pump Technical Committee will present its annual *Best Paper Award* and *Best Student Paper Award* to the authors of the paper judged as the best among those presented at the previous year's congress. For 2005, the paper by Khiem Dinh and William E. Lear of the University of Florida entitled "Effects of Heat Transfer From a Scroll Compressor Using Heat Pipes" has been selected as the Best Paper. The award also carries a \$500 cash award, and will be presented to the authors at the AESD Luncheon. In addition, the paper by Vaibhav Malhotra, William E. Lear, J. R. Khan, and S. A. Sherif entitled "Life Cycle Cost Analysis of a Novel Cooling

and Power Gas Turbine Engine" has been selected as the 2005 Best Student Paper Award. The paper was presented by Mr. Vaibhav Malhotra (a graduate student at the University of Florida), and this award will also be presented at the AESD Luncheon.

Additionally, numerous members of the AESD were recognized by ASME at large over the past year. Sriram Somasundaram received an ASME Dedicated Service Award in 2005, which was presented to him by Srinivas Garimella and Yogi Goswami at the 2005 AESD Luncheon. Abel Hernandez-Guerrero of the Universidad de Guanajuato will receive the ASME Johnson & Johnson Consumer Companies, Inc. Medal at the Honors Dinner at the 2006 IMECE. This award recognizes an outstanding contribution toward developing and implementing practices, processes and programs focused on diversity and inclusiveness. ❖

Several opportunities are available for AESD authors to publish their technical articles. These include symposia, the monthly Mechanical Engineering, and archival journals. AESD authors are encouraged to give a tangible expression of their ASME affiliation by considering these publication outlets.

Opportunities for publishing technical papers are provided by the symposium volumes of the IMECE AESD technical sessions. Normally one or more such volumes are prepared annually, comprised of the dozens of papers presented at the IMECE. Such papers may be eligible for consideration for the prestigious E.F. Obert Award, as well as individual technical committee awards.

Symposium volumes are available for purchase at IMECE or may be ordered directly from ASME technical

publications. Abstracts are generally due in January for papers to be presented at the following IMECE. Authors wanting to participate at the IMECE should check the calls for papers in the monthly meetings calendar in Mechanical Engineering or visit <http://www.asme.org/events/>.

In addition to the IMECE, every summer for nearly 20 years, AESD also has participated in symposia held outside the United States at various memorable sites, as discussed in the AESD Conference Activities section below. For information concerning upcoming conferences, authors should check the meetings calendar in Mechanical Engineering or visit <http://www.asmeconferences.org/>.

Additional outlets for technical articles by AESD authors are provided by the archival ASME journals, Journal of Energy Resources Technology,

Journal of Engineering for Gas Turbines and Power, Journal of Turbomachinery, and the new Journal of Fuel Cell Science and Technology. Owing to peer review requirements and some queuing of accepted papers before publication, a year or more can elapse between submission and publication. Still, archival journals are the appropriate forum for articles of enduring value.

For answers concerning your questions about AESD publishing opportunities contact M.J. Moran (contact information is provided in the roster at the end of the newsletter). This newsletter also welcomes articles of general interest to the Division membership. Interested authors should contact Laura Schaefer, the Newsletter Editor, at the address given in the roster at the end of this publication. ❖

AESD CONFERENCE ACTIVITIES

In addition to organizing Advanced Energy Systems division sessions (see page 5 for more information), AESD members have also created and are participating in sessions for the 2006 IMECE's general Energy Track. These sessions will be held Tuesday, November 7, through Thursday, November 9. These sessions are designed to bring together professionals from academia, industry, and the government to discuss pressing energy issues currently facing the U.S. and the world. Energy track session topics include the supply and demand sides of energy, alternative and advanced energy sources, energy security, opportunities and technologies for conservation, and transportation after peak oil. The majority of the Energy Track sessions are panel sessions, and audience participation is strongly encouraged.

AESD members are also active in a number of additional national and international conferences. In conjunction with the Solar Energy Division, the AESD is sponsoring the Energy Sustainability conference in June 2007. The conference will be held June 27-29 in Long Beach, California. The conference will be organized into five general tracks: Fuel Cells, Systems Analysis, and Hydrogen Energy; Energy Policy and Sustainability; Thermal Management, Direct Thermal Conversion, and Power Generation; Heat Pumps, Refrigeration Systems, and Climate Control; and Energy Systems Miniaturization and Micro and Nano Scale Energy Transport. The conference will consist of plenary talks, invited talks, panel discussions, workshops, tutorials, technical sessions, and poster presentations and exhibitions. Abstracts of approximately 400 words are due October 31, with draft and final papers due January 15 and April 2, respectively. All papers submitted to Energy Sustainability 2007 will undergo dual peer-review for publication in the conference proceedings and the *ASME Journal of Solar Energy Engineering* or the *ASME Journal of Energy Resources Technology*. The Energy Sustainability web site is <http://www.asmeconferences.org/ES2007>.

In 1985, the Systems Analysis Technical Committee of the AESD, led by Richard Gaggioli, decided to not only present sessions at the IMECE (which was then called the ASME Winter Annual Meeting), but to also strive to broaden the participation of non-U.S. scientists and engineers. To that end, the SATC's first overseas conference occurred in Rome, Italy, in 1987, and was chaired by Enrico Sciuabba and Michael Moran. In 1992, the conference was renamed ECOS, an acronym for the Efficiency, Costs, Optimization, and Simulation of Energy Systems. ECOS conferences have been held in China, Greece, Spain, Poland, Turkey, Japan, and numerous other countries. ECOS 2006 was held in Crete, Greece from July 12-14. "Ecos" means "home" in Greek, giving the title of the conference a double meaning not only as a home for an exchange of ideas, but also representing the impact of these technologies on our home the Earth. Keynote speakers at ECOS 2006 included Dr. George Hatsopoulos and Dr. Elias Gyftopoulos. ECOS 2007 will be held in Padova, Italy, from June 25-28. ECOS 2008 is set for Krakow, Poland, for June 24-27. The ECOS 2007 web site is <http://www.ecos2007.dim.unipd.it/>.

The AESD has also participated in the ASME fuel cell conferences. The Fourth International Conference on Fuel Cell Science, Engineering and Technology was held on June 19-21, 2006, in Irvine, California. Additionally, ASME contributed to the first European Fuel Cell Technology and Applications Conference, which was held December 14-16, 2005, in Rome, Italy. Papers submitted to each of these conferences are considered for publication by the ASME Journal of Fuel Cell Science and Technology. ❖

Direct Thermal Power Conversion and Thermal Management

The Direct Thermal Power Conversion and Thermal Management Technical Committee promotes research and development in all areas of direct conversion of heat to electric power without any moving parts or thermal management of energy. Direct thermal energy conversion devices include thermionics, thermoelectrics, AMTEC (alkali metal thermal to electric converter), and TPV (thermophotovoltaics). All areas of thermal management including aircraft and spacecraft, ground vehicles, electric components and power systems, and industrial energy systems are covered.

The committee participates in IMECE and other special conferences related to advanced energy systems. The committee sponsored two technical sessions at the 2005 IMECE. At the 2006 IMECE in Chicago, Illinois, two sessions have been organized, and a Symposium on Heat Pump and Refrigeration cycles and CHP Systems has been cosponsored. Researchers involved in the subjects mentioned above and other related issues, are encouraged to attend and take part in the activities of this committee. The 2006 meeting will be held on Tuesday, November 7, 2006, from 3:00 to 4:00 pm. New ideas and participants are welcome.

Heat Pumps

The Heat Pump Technical Committee (HPTC) has maintained an active role in disseminating the latest developments in all theoretical and applications aspects of heating and cooling technologies, which have been changing rapidly in recent years. The recent national and global emphasis on energy efficiency and the environmental impact of heating and cooling technologies has provided numerous exciting opportunities for heating and cooling research and development. New developments include advanced electric and heat-activated chiller and heat pump systems; cooling, heating, and power (CHP) technologies; novel and environmentally friendly refrigerants and working fluids including corrosion inhibitors; fundamental heat and mass transfer issues in heat pump components; novel heat exchanger materials and designs; system simulation; integration and implementation issues; and compressor design.

The HPTC strives to help move the development of heating and cooling technologies from theoretical concepts to viable applications, with a mix of contributions from industry, academia and government agencies. The HPTC organizes technical sessions at the IMECE to bring together researchers working on these technologies. During the 2005 IMECE, the HPTC committee sponsored four technical sessions and

one panel session on topics that included CHP, global warming, and CFD techniques, which were well attended and stimulated interesting discussions. At the 2006 IMECE in Chicago, Illinois, five technical sessions have been coordinated by the HPTC, including a joint session with the Direct Thermal Power Conversion and Thermal Management committee. These sessions will be held on November 5, 6, and 7. Members of the HPTC have also been active in organizing the overall Advanced Energy Systems Division sessions and general Energy tracks.

The HPTC meets once a year at the IMECE. Researchers interested in the above-mentioned topics and other related issues are encouraged to attend and participate in the activities of this committee. Potential sessions for the 2007 IMECE will be discussed at the HPTC meeting on Tuesday, November 7, 2006, from 3-4 pm, and new members and contributions are welcome.

Systems Analysis and Fuel Cells

The activities of the Systems Analysis Committee were recently formally expanded to include activities related to the design of fuel cells and fuel cell systems. This designation reflects the committee's continuing activities in the areas of fundamental thermodynamics; system design, analysis, and optimization; and application of these concepts in the specific area of fuel cell technology. The committee organized and presented the *2005 Symposium on Thermodynamics and the Design, Analysis, and Improvement of Energy Systems* at the 2005 IMECE. Forty-three presentations were given in nine technical sessions including sessions on energy system design and analysis; combined heat and power; energy systems and the environment; and fuel cell systems. Chairs and co-chairs for these sessions originated from industry, government agencies, and academia. The committee wishes to thank the session chairs as well as Michael Ellis and Mansour Zenouzi for their hard work in organizing the 2005 Symposium.

With the goal of encouraging the participation of young researchers, the Systems Analysis Technical Committee presents a Best Student Paper Award for papers in which the first author and presenter is a full-time student. In addition, to encourage and recognize outstanding scholarship at all levels of experience, the committee presents a Best Paper Award. The 2005 recipients of the Best Student Paper Award were C.R. Buie (student author/presenter), J.D. Posner, T. Fabian, S.W. Cha, F.B. Prinz, J.K. Eaton, and J.G. Santiago, for their paper, "Active water management for proton exchange membrane fuel cells using an integrated electro-osmotic pump." The winners of the 2005 Best Paper Award were D. Rancruel

and M.R. von Spakovsky for their paper "Development and application of a dynamic decomposition strategy for the optimal synthesis/ design and operational/control of a SOFC based APU under transient conditions."

At the IMECE 2006, the Systems Analysis Technical Committee is sponsoring the *2006 Symposium on Thermodynamics and the Design, Analysis, and Improvement of Energy Systems* which includes ten technical sessions on topics such as fundamentals of thermodynamics; energy system analysis and design; fuel cell technology and applications; thermoeconomics; and alternative energy systems. These sessions will be held during November 5-7 at the IMECE in Chicago. The committee wishes to thank the session chairs as well as the Symposium organizers, Mansour Zenouzi and Enrico Sciubba, for their hard work organizing the 2006 Symposium. A call for papers for the 2007 Symposium to be held at IMECE 2007 November 7-17 in Seattle, WA, will be issued in November.

The Systems Analysis and Fuel Cell Technical Committee also sponsored *ECOS 2006: Efficiency, Cost, Optimization, Simulation and Environmental Impact of Energy Systems* which was held July 12-14, 2006 in Crete, Greece. The conference was well attended, and contained many interesting paper presentations and panel sessions. The 2007 ECOS Conference will be held June 25-28, 2007 in Padova, Italy. The abstract deadline is October 27, 2006 and details are available at www.ecos2007.dim.unipd.it

The Systems Analysis and Fuel Cell Technical Committee meets once a year at the IMECE. The 2005 committee meeting was well attended. New officers for 2005 included Dr. Michael Ellis, Chair, Dr. Mansour Zenouzi, Symposium Chair, and Dr. Enrico Sciubba, Symposium Co-Chair. Researchers interested in topics related to thermodynamics, energy systems analysis and design; and applications to fuel cell systems are encouraged to attend and participate in the committee activities. The 2006 Committee Meeting will be held Tuesday, November 7 from 3:00pm - 4:00pm.

Energy Systems Miniaturization

The primary objectives of this committee are to increase its membership (from academia, industry and government labs) and to sponsor sessions at the IMECE and IECEC. At the 2005 IMECE, the committee sponsored a technical session on *Meso/Micro/Nanoscale Energy Systems*, in which five papers and two technical presentations were given. The Energy Systems Miniaturization TC is sponsoring a similar session on Wednesday at the 2006 IMECE on *Micro/Meso-Scale Energy Conversion/Storage Devices* with four papers. ❖

Mark Your Calendars!

AES Division Active at the IMECE in Chicago, Illinois (November 5-10, 2006)!

The AES Division has planned a very stimulating technical program at this year's IMECE in Chicago, Illinois. A total of 17 sessions on current topics will be held. The papers scheduled in these sessions include numerous contributions from outside the U.S. and from industry, demonstrating the wide-ranging and global appeal of the technical topics being addressed by the AES Division. A list of session titles is provided below. Please be sure to participate in these informative sessions and add your valuable input wherever possible, especially during the discussion period at the end of each paper or panel presentation. We hope to see you there.

Thermal Management and Direct Energy Conversion

Thermal Management
Thermal Systems Analysis
Advances in Residential Energy Systems (Co-sponsored)

Topics in Heat Pumps, Coolers, Compressors, and CHP (Combined Cooling, Heating and Power)

Fluid Mechanics and Heat Transfer in Heat Pump Components
Emerging Heat Pump/Cooling, Heating, and Power (CHP) Systems
Global Climate Change and Heat Pumps/Refrigeration Cycles
Emerging Technologies in Sorption and Desiccant Systems
Advances in Residential Energy Systems (Co-sponsored)

Thermodynamics and the Design, Analysis, and Improvement Of Energy Systems

Fundamentals of Thermodynamics
Energy Systems Analysis and Design
Exergy Analysis
Fuel Cell Technology
Fuel Cell Systems Analysis
Fuel Cell Applications
Thermoeconomic Analysis of Energy Systems
Alternative Energy Systems Analysis
Power Plant and Thermochemical Cycles Analysis

Meso/Micro/Nanoscale Energy Systems and Conversion Devices

Micro/Meso-Scale Energy Conversion/Storage Devices

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ADVANCED ENERGY SYSTEMS DIVISION 2006-2007

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