

# ADVANCED ENERGY SYSTEMS DIVISION

EDITOR: Michael Ellis

FALL 2007

## CHAIR'S MESSAGE *Dr. Abel Hernandez-Guerrero*



After many years of involvement in many different activities within ASME I now have the honor and the responsibility of chairing the Advanced Energy Systems Division.

Our division has moved from having about 900 primary members back in 2000 and 2001 to about 1900 in 2007. This is clearly due to the tremendous effort put forward by those AESD members that participate very actively at all levels: reviewers, session chairs and co-chairs, symposium chairs, technical committees chairs, up to the division's executive members. Without their never-ending commitment all the division activities would not exist.

Back at the end of the last decade our society started a process of transformation, started by the *Futures Team*, a committee that was created to forecast the future of our society and of

mechanical engineering as a whole. Based on the ideas that emanated from that committee our society started a *Continuity and Change* approach. These changes were fueled by the increasing membership age with less younger engineers joining our society and by a financial decrease in the society capital. These changes have started to affect the way we conduct business at the division's levels, creating track-sessions where we used to organize symposiums within the division at each IMECE. This of course will have an effect in the income to our division, since now we will have papers being in technical sessions shared by other divisions, and therefore the allocation of money for that session will be also shared. The change is here and there is nothing we can do about it. Therefore it will be in the best interest of the division that we focus very thoroughly in its activities, more than ever. Now ASME's divisions need to re-align with the new organizational structure of the Council of Engineering and of the Energy

### INSIDE

Publication Opportunities.....	2
AESD Conference Activities.....	3
Technical Committee Reports .....	3-4
IMECE 2007 Activities .....	5
IMECE 2008 Call for Papers .....	5
ES 2008 Call for Papers.....	6
Contact Information.....	7

Institute, to both of whom our AESD belongs.

This reorganization of the ASME structure is coupled now to the energy crisis that is slowly reaching us. The price of oil has now topped prices that have suddenly reminded everybody of the intrinsic volatility of energy costs and the ever-increasing world-dependency on oil. This brings new opportunities to our division's members. Being able to design more efficient systems has become a key element in fighting the pollution effects of energy production while at the same time decreasing the use of energy resources.

Our division is increasing its participation in renewable energy technologies, each year providing more

*Continued on Page 2.*

## AESD DIVISION AWARDS AND KEYNOTE LECTURE

The AES Division recognizes the contributions of its members, 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 energy research and technology.

At the 2006 IMECE luncheon the

speaker was Amir Faghri, the United Technologies Chaired Professor in Thermal-Fluids Engineering in the Department of Mechanical Engineering at the University of Connecticut. Dr. Faghri spoke on "Advances in micro/-miniature 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. 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.

The 2007 AESD luncheon was held on Tuesday, November 13 at the IMECE. The speaker for the 2007 luncheon was Dr. Yogi Goswami. Dr. Goswami is the John & Naida Ramil Professor of Chemical Engineering at the University of South Florida in

*Continued on Page 2*

forums for its members to present leading edge research in these types of energy systems.

Currently our division is teaming up with other ASME divisions to organize joint conferences. Our division also makes every effort to reach to members of industry, as well as of foreign researchers. Each year the total of papers combined of foreign researchers and those papers from industry reach a respectable percentage of the total participation in technical sessions. The division our

also sponsors several conferences held in countries around the world (like ESDA and the ECOS conferences).

I would like to recognize the efforts of our previous executive committee, under the leadership of Muhammad Rahman. Without their hard work the changes in effect in ASME could have caused a great deal of problems.

We would like to invite all mechanical engineers (from industry, academia and government) who are related to the fields of energy, power

generation, distribution, storage, hydrogen technologies, renewable energy technologies, etc. to become involved in our activities. Please check our division's directory and feel free to contact the technical committee chair of those areas of your interest, or contact me directly and I will make every effort to get you involved in the activities of the Advanced Energy Systems Division

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

Tampa, Florida. He is internationally known for fundamental and applied research in solar thermal energy, solar photocatalytic detoxification, PV, and hydrogen. He has published 14 books and more than 190 refereed papers and is the Editor-in-Chief of *Solar Energy*, and *Advances in Solar Energy: An Annual Review*.

Dr. Goswami is a recognized leader in professional scientific and technical societies. He has served most recently as the President of the International Solar Energy Society (ISES), and a Governor of ASME-International. Dr. Goswami is a Fellow of the ASME International, and the American Solar Energy Society. He is the 2007 recipient of the Farrington Daniels Award presented by ISES for outstanding intellectual leadership in renewable energy and the 2007 recipient of the Frank Kreith Award

from ASME.

At the Awards Luncheon, the Systems Analysis and Fuel Cells Technical Committee (SATC) and the Heat Pump Technical Committee (HPTC) presented awards for best student paper and best paper presented at the preceding IMECE 2006. For the SATC, the 2006 recipients of the Best Student Paper Award are George Tsatsaronis, Solange O. Kelly (student author-presenter), and Tatiana V. Morosuk, for their paper "Endogenous and exogenous exergy destruction in thermal systems." The winners of the SATC 2006 Best Paper Award are Kau-Fui Wong and Tarun Bhshkar, for their paper "Transport properties of alumina nanofluids".

For the HPTC, the 2006 Best Student Paper Award was presented to Elise Estiot, Stefan Natzer, Mario

Harm, Christoph Kren, and Christian Schweigler for their paper "Heat exchanger development for compact water/LiBr sorption systems". The recipients of the 2006 HPTC Best Paper Award are Stefan Plura, Christoph Kren, and Christian Schweigler for their paper "Efficient and Flexible Tri-Generation with Two-Stage Absorption Chiller".

Additionally, numerous members of the AESD were recognized by ASME at large over the past year. Award winners included Abel Hernandez-Guerrero of the Universidad de Guanajuato who received the ASME Johnson & Johnson Consumer Companies, Inc. Medal which recognizes an outstanding contribution toward developing and implementing practices, processes and programs focused on diversity and inclusiveness.

PUBLICATION OPPORTUNITIES FOR AESD AUTHORS

*Dr. M.J. Moran*

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 Tech-

nology. 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 M.W. Ellis, the Newsletter Editor, at the address given in the roster at the end of this publication.

## AESD CONFERENCE ACTIVITIES

AESD members sponsored the 2007 IMECE's Track 6: Energy Systems: Analysis, Thermodynamics, and Sustainability and co-sponsored Track 16: Sustainable Products and Processes. Specific topical areas for these tracks are listed on page 5. In addition, AESD members co-sponsored a panel discussion on issues in computational and experimental fluid dynamics. AESD sponsored sessions were held Monday November 12 to Thursday November 15.

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 August 2008. The conference will be held August 10-14 in Jacksonville, Florida. All papers submitted to Energy Sustainability 2008 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 Conference web site and other details are provided on page 6 of this newsletter.

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 2007 was held in Padova, Italy from June 25-28. "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 2007 included Dr. Paolo Scaroni, Dr. Richard Gaggioli, and Dr. Michael von Spakovsky. ECOS 2008 will be held in Krakow, Poland, from June 24-27. The ECOS 2008 web site is <http://www.ecos2008.polsl.pl/>.

The AESD has also participated in ASME fuel cell conferences. The *Fifth International Conference on Fuel Cell Science, Engineering and Technology* was held on June 18-20, 2007, in Brooklyn, NY. Additionally, ASME is contributing to the *Second European Fuel Cell Technology and Applications Conference*, which will be held December 11-14, 2007, in Rome, Italy. The *ASME 6th Annual Fuel Cell Science, Engineering & Technology Conference* will be held June 16-18, 2008 in Denver, Colorado and will focus on both high and low temperature fuel cells applied in transportation, stationary, and specialized applications. Abstracts are due January 7, 2008. The conference website is <http://www.asmeconferences.org/FuelCell08/>. Papers submitted to each of these conferences are considered for publication by the *ASME Journal of Fuel Cell Science and Technology*. ❖

## TECHNICAL COMMITTEE REPORTS TC Chairs

### Direct Thermal Power Conversion and Thermal Management

The Direct Thermal Power Conversion and Thermal Management Technical Committee promotes research and development in direct conversion of heat to electric power and in 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. At the 2006 IMECE, the committee organized two technical sessions and co-

sponsored a symposium. At the 2007 IMECE in Seattle, a session on renewable energy from biomass has been organized. Researchers involved in the subjects mentioned above and other related issues, are encouraged to take part in the activities of this committee. 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. Recent national and global emphasis on energy efficiency and the environmental impact of heating and cooling technologies has provided exciting opportunities for heating and cooling research and development. New

developments include advanced electric and heat-activated chillers and heat pumps; combined cooling, heating, and power technologies; new environmentally friendly refrigerants and working fluids including corrosion inhibitors; heat and mass transfer issues in heat pump components; heat exchanger materials and designs; compressor design; simulation; and integration and implementation issues.

The HPTC strives to help move the development of heating and cooling technologies from theoretical concepts to applications, with 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 2006 IMECE in

*Continued on Page 4*

### Heat Pumps...continued

Chicago, the HPTC sponsored five technical sessions and one panel session on topics that included CHP, global warming, and CFD techniques as well as a joint session with the Direct Thermal Power Conversion and Thermal Management Committee. These sessions were well attended and stimulated interesting discussions. At the 2007 IMECE in Seattle, technical sessions were coordinated by the HPTC on November 13 and 15. Members of the HPTC have also been active in organizing the overall AESD 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 participate in the activities of this committee. New members and contributions are welcome.

### Systems Analysis and Fuel Cells

The activities of the Systems Analysis Committee (SATC) were recently expanded to include the following: design and application of fuel cells, cogeneration, hydrogen technologies, environmental impact of energy systems, and application of micro- and nanotechnologies in energy systems. These activities reflect the committee's continuing work in the areas of fundamental thermodynamics, system design, analysis, and optimization; and also the application of these concepts in the specific areas of fuel cell technology, hydrogen technology, and environmental impacts of the energy systems. The committee organized and presented the 2006 Symposium on Thermodynamics and the Design, Analysis, and Improvement of Energy Systems at the IMECE2006. Forty presentations were given in ten technical sessions including sessions on energy system analysis and design, exergy analysis, thermodynamics, fuel cell technology and applications, thermal systems analysis, thermo-economic analysis of energy systems, alternative energy systems, and power plant and thermochemical cycle analysis. Chairs and co-chairs originated from industry, government agencies, and academia. The committee wishes to thank all the session chairs and co-chairs as well as Mansour Zenouzi and

Enrico Sciuabba for their hard work in organizing the 2006 Symposium.

With the goal of encouraging the participation of young researchers, the SATC presents a Best Student Paper Award for papers in which the 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 2006 recipients of the Best Student Paper Award were George Tsatsaronis, Solange O. Kelly (student author/presenter), and Tatiana V. Morosuk, for their paper "Endogenous and exogenous exergy destruction in thermal systems." The winners of the 2006 Best Paper Award were Kau-Fui Wong and Tarun Bhshkar, for their paper "Transport properties of alumina nanofluids."

At the IMECE2007, SATC sponsored the 2007 Symposium on Energy Systems Analysis, Thermodynamics, and Sustainability in Track 6 which included 15 technical sessions on topics such as fundamentals of thermodynamics; energy systems and the environment; applications of micro- and nanotechnologies to energy systems; design and analysis of complex energy conversion systems; design and analysis of cogeneration & tri-generation systems; low and high temperature fuel cell systems analysis; hydrogen energy technologies; thermoeconomics: theory and applications. These sessions were held during November 11-15 at the IMECE2007 in Seattle, WA. The committee wishes to thank the session chairs as well as the Symposium organizers, Enrico Sciuabba and Vittorio Verda, for their hard work organizing the 2007 Symposium. A call for papers for the IMECE 2008 appears on page 5 of this newsletter.

The SATC sponsored the Energy Sustainability 2007 conference which was organized jointly by SED and AESD of ASME held June 27-30 in Long Beach, California. The conference was well attended and contained many papers of interest to SATC members. Energy Sustainability 2008 will be held August 10-14, 2008 in Jacksonville, Florida. The committee also sponsored the 2007 ECOS Conference in Padova, Italy. The 2008 ECOS Conference will be held June 24-27, 2008 in Gliwice, Poland. Abstracts are due by November

30, 2007. Details are available at [www.ecos2008.polsl.pl](http://www.ecos2008.polsl.pl).

The SATC currently meets once a year at the IMECE. The 2006 committee meeting was well attended. New officers for 2006-2007 included Dr. Mansour Zenouzi, Chair, Dr. Enrico Sciuabba, Symposium Chair, and Dr. Vittorio Verda, Symposium Co-Chair. Researchers interested in the above-mentioned topics and other related issues are encouraged to participate in the committee activities.

### 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 2006 IMECE, the committee sponsored a technical session on *Micro/Meso-Scale Energy Conversion/Storage Devices* with four papers presented. The Energy Systems Miniaturization TC co-sponsored a similar IMECE session on Tuesday November 13 at the 2007 IMECE. ❖

### **AES Division Activities at the 2007 IMECE in Seattle, Washington**

The AES Division sponsored a total of 17 sessions at IMECE 2007 on a variety of energy related topics. The papers scheduled in these sessions included 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.

#### **Emerging Technologies in Heat Pump/CHP Systems**

#### **Fluid Mechanics and Heat Transfer in Heat Pump/CHP Systems**

#### **Renewable Energy from Biomass**

#### **Fundamentals of Thermodynamics**

#### **Energy Systems and the Environment**

#### **Applications of Micro- and Nanotechnologies to Energy Systems**

#### **Design and Analysis of Complex Energy Conversion Systems**

Power Plant Design and Analysis

Modeling and Performance of Thermodynamic Systems

Performance Improvement of Thermodynamic Systems

#### **Design and Analysis of Cogeneration & Tri-generation Systems**

#### **Low and High Temperature Fuel Cell Systems Analysis**

Stack and System-Level Analyses of PEM Fuel Cell Systems

Cell-Level Analysis of Solid Oxide Fuel Cells

Stack and System-Level Analyses of Solid Oxide Fuel Cell Systems

#### **Hydrogen Energy Technologies**

#### **Thermoeconomics: Theory and Applications**

#### **Panel on CFD/CFD (Experimental Fluid Dynamics) Choice – A Dilemma for Industries**

## **2008 ASME International Mechanical Engineering Congress and Exposition (IMECE)**

**November 2 - 6, 2008 — Boston, MA, USA**

### **Call for Papers:**

#### **Track 6: Energy Systems: Analysis, Thermodynamics, and Sustainability**

Authors and presenters are invited to participate in the Energy Track of the 2008 IMECE to expand international cooperation, understanding and promotion of efforts and disciplines in the areas of energy systems analysis, thermodynamics, and sustainability. Papers presented in this track will emphasize dissemination of research results, new developments, and novel system concepts relating to energy systems analysis, thermodynamics, and sustainability. A variety of sessions are available for paper presentations, and papers will be grouped into common interest areas to facilitate discussion.

Papers presented at this Symposium will be eligible for the prestigious ASME Edward F. Obert Award for the best paper on Thermodynamics. In addition, the Systems Analysis and Fuel Cell Technical Committee and the Heat Pump Technical Committee will each present a "Best Paper Award" and a "Best Student Paper Award" in their respective fields.

#### ***Abstracts are invited for presentation and publication in the following areas:***

Fundamentals of Thermodynamics and Thermoeconomics

Design and Analysis of Complex Energy Conversion Systems

Energy Systems and the Environment

Alternative Energy and Sustainable Energy Systems

Heat Pumps and Combined Heat and Power Systems

Low and High Temperature Fuel Cell Systems Analysis

Hydrogen Energy Technologies

Low/Zero Emission Power Plants

Education in Thermodynamics, Energy Systems, and Sustainability

Energy Systems Miniaturization

Direct Energy Conversion

#### ***Authors should submit a 400-word text-only abstract to:***

<http://www.asmeconferences.org/Congress08/>

**ABSTRACT DUE DATE: March 3, 2008**

**CALL FOR PAPERS**  
**"2<sup>nd</sup> International Conference on Energy Sustainability - 2008"**  
Conference Organized Jointly by  
Solar Energy Division (SED) and Advanced Energy Systems Division (AESD)  
of ASME International  
August 10-14, 2008  
The Hyatt Regency, Jacksonville, Florida

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Co-Located with Heat Transfer, Fluids Engineering, and the Nano Institute Conferences

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**INVITATION**

We invite researchers, engineers, scientists architects, consultants, and policy-makers in industries, R & D laboratories & Government establishments to participate in this exciting event meant as a forum to exchange innovative ideas, leading edge concepts, new technologies and devices, ongoing R&D efforts, prototype and demonstration projects, commercialization technologies and projects, and visions of the future related to the general theme of **Energy Sustainability**. The conference will consist of plenary talks, invited talks, panel discussions, workshops, tutorials, technical sessions, poster presentations and exhibitions, thus providing a unique opportunity for communication and collaboration between academia, industry and planners in the areas of Energy Efficiency, Renewable Energy and Advanced Energy Technologies.

**All papers submitted to SED/AESD '08 will undergo dual peer-review for publication in the ASME Conference Proceedings and the ASME Journal of Solar Energy Engineering or the ASME Journal of Energy Resources Technology.**

**LIST OF ADVANCED ENERGY SYSTEMS TOPICAL AREAS**

- |  |   |
|--|---|
| 1 Energy and Global Climate Change                 | 11 Advances in Fuel Cells and Hydrogen Storage                                |
| 2 Emerging Energy Policy Issues                    | 12 Heat Pump Systems & Technologies   |
| 3 International and National Energy Standards      | 13 Distributed & Combined cooling, Heating and Power Technologies (CHP, CCHP) |
| 4 Life-cycle Costing of Energy Systems             | 14 Advances in Geothermal Technologies  |
| 5 Reducing the Eco-Footprint of Energy Systems     | 15 Thermodynamics for Energy Systems  |
| 6 Alternatives to Carbon-Based Energy Technologies | 16 Fluid-thermal Sciences for Energy Systems                                  |
| 7 Sustainable Energy Figures of Merit              | 17 Energy Systems Miniaturization   |
| 8 Energy Systems Technologies, Analysis and Design | 18 Climate Control  |
| 9 Performance Results of Renewable Energy Systems  | 19 Low Grade Thermal Energy Utilization                                       |
| 10 Alternatives to Transportation Fuels            | 20 Low/Zero Emission Power Plants   |
|  | 21 Exergy for Sustainability  |

**ABSTRACTS**

**Authors should submit a 400-word (maximum) text-only abstract to:**

<http://www.asmeconferences.org/ES2008/>

**ABSTRACTS DUE DATE: January 7<sup>th</sup>, 2008**

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