



The International Information Center for Multiphase Flow

NEWSLETTER

No.30 May 2008

The Japanese Society for Multiphase Flow



Sixth International Conference on Enhanced, Compact and Ultra-compact Heat Exchangers: Science, Engineering and Technology September 16–21, 2007, Potsdam, Germany

by Masaru Ishizuka

This conference was held at Seminar SeeHotel An der Pirschneide 40, D-14471, Potsdam, Germany during September 16-21, 2007.

It was chaired by Dr. R. K. Shah, Subros Ltd India and co-chaired by Professor M. Ishizuka, Toyama Prefectural University, Japan, Professor A.M. Jacobi, University of Illinois at Urbana Champaign, USA and Dr. Vishwas V. Wadekar, Aspen Technology Ltd. UK, and sponsored by Engineering Conferences International, USA.

Compact Heat Exchanger (CHE) technology has been advancing considerably over the last couple of decades.

The following is the chronology of this conference series:

- First International Conference in Snowbird, Utah, USA during June 22-27, 1997.
- Second International Conference in Banff, Canada during July 18-23, 1999.
- Third International Conference in Davos, Switzerland during July 2-6, 2001.
- Fourth International Conference in Crete Island,

Greece, during September 29 - October 3, 2003.

- Fifth International Conference in Whistler, Canada during September 11-16, 2005.

Each of these conferences was attended by about 70-90 specialists with about 35-50% participants from industries.

The conference program included Keynote lectures, tutorial lectures/short course, panel discussions, and contributed technical papers. These conferences were highly successful and unique, bringing together an effective mix of technical specialists from industry, universities and government organizations for technical discussions on a much focused subject area.

This conference accepted a total of 69 papers from 16 countries and they are divided into the following sections.

- ♦ Recent Developments in Heat Exchangers Studies
- ♦ Single-Phase Heat Transfer Enhancement
- ♦ Measurement Techniques for Heat Exchangers
- ♦ Single-Phase Heat Transfer Enhancement with Vortex Flow
- ♦ Compact Heat Exchanger Design Data

To Join ICeM:

Everybody, who is interested in “multiphase flow”, can be a member of ICeM. You are welcome to join ICeM. Please contact one of the following to register as an ICeM member.

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- ♦ General Papers in Poster Session
- ♦ Heat Transfer Enhancement and High Temperature Heat Exchangers
- ♦ High Temperature Heat Exchangers
- ♦ Single-Phase Heat Exchanger Development and Applications - I
- ♦ Single-Phase Heat Exchanger Development and Applications - II
- ♦ Phase-Change Heat Exchanger Studies - I
- ♦ Phase-Change Heat Exchanger Studies - II
- ♦ Phase-Change Heat Exchanger Fundamental Studies and Applications
- ♦ Phase-Change Heat Exchanger Applications
- ♦ Phase-Change Heat Exchanger Development and

Applications

These papers represent a focused attention for the use of CHEs Science, Engineering and Technology and indicate enormous opportunities.

We appreciate the efforts and assistance provided by the following regional committee members who took the responsibility of encouraging appropriate experts from industry and academia to present papers and getting submitted papers reviewed.

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Global Conference & Exhibition 2007 'fotek.g.' 'Towards intelligent flow measurement & control system' September 26–28, 2007, FCRI, Palakkad, Kerala, India

by M.Viswanathan

Summary Report on 'fotek.g.'

The above International Conference 'fotek.g' was held at Fluid Control Research Institute (FCRI), Palakkad, Kerala, India during 26-28 September 2007. Following are the highlights of the conference.

The welcome speech was made by Dr. Surajit Mitra, Chairman, GC, FCRI & Jt. Secretary, Dept. of Heavy Industries, Govt. of India. While addressing the valedictory function, Shri. Sontosh Mohan Dev, Hon. Minister of Heavy Industries & Public Enterprises, Govt. of India, had announced that his Dept. will provide all necessary support for increasing the commercial activities of FCRI and will support all its future programmes in the best possible way. He was very much pleased on the successful conduct of the conference and praised FCRI Team for their dedicated contribution. Prior to the function, the Minister visited various labs and inaugurated the Flow Museum & Documentation Centre of FCRI. He promised all help to upgrade our Documentation Centre.

More than 60 Papers were read during the Conference in 22 Technical Sessions spread over 3 days. Chairmen of Technical Sessions were from flow experts drawn from relevant field from India & abroad. Technical proceedings are available in soft & hard copy forms. Financial support were sought from various Corporate who have generously supported the conference.

The technical sessions include the topics:

Flow metering techniques for process measurement & control, Custody transfer, metering of liquid

petroleum/natural gas, compressed natural gas/liquefied natural & petroleum gas, Emerging trends & new technologies for flow/process measurement, Wet gas/multiphase flow measurement/tomography/Nano fluids, Unaccounted for water, water metering, transmission/distribution & open channel measurement, SCADA, IT & Intelligent flow management & software for flow measurement & control, Flow control valves, Valves, pressure regulators & other control elements, Flow meter modeling & simulation techniques, Flow calibration, research facilities, uncertainty, traceability & intercomparison, Pumps, fans & blowers for flow systems.

The inaugural technical address was by Emeritus Prof. Mike Sanderson, Cranfield University U. K. & Editor-in-Chief, Flow Measurement & Instrumentation Journal.

The Key Note Speakers included various eminent persons at International level like Dr. Richard Furness, JDF, UK, Mr. Trilochan Gupta, Emerson, Singapore, Mr. Ian MacLeod, Master Meter, USA, Mr. Keitmann-Curdes, Flexim, Germany, Mr. Danny Chrust, Arad, Israel, Dr. Richard Steven, CEESI, USA etc.. & BARC, IGCAR, IITs, IOCL, ONGC, CVRDE, GAIL, BHEL, Reliance etc.. at National level.

Also, a souvenir was brought out covering the messages from eminent personalities like President of India, Vice President, Chief Minister, Kerala etc. and advertisements from various companies totaling around 150. This souvenir also includes a detailed technical write up on the activities of FCRI & functioning of

various labs & FCRI's interaction with various industries etc. A Flowmeter Directory giving addresses of Indian industries of flow products is also included.

About 30 flow product exhibitors have participated in this Conference. For the valedictory function, the eminent dignitaries were present.

We have received a large number of participants' views during the Conference. On going through the views of majority of the participants, the impression is that the Conference was a timely requirement and a

similar exercise should be conducted periodically to appraise the engineers working in the flow product industries in India about the recent advances happening elsewhere in other countries on flow engineering.

The conference was successful in all respects.

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Report on Boiling Heat Transfer And Boiling Equipment, a five day short course held in Pisa, Italy on October 8–12, 2007

by Paolo Di Marco

Boiling is an essential basic operation in thermal sciences. It is the most effective heat transfer method because of its high performance due to latent heat transport, thus allowing to reduce size, weight and volume of heat exchange devices and improve the thermal performance of components for the process industry and power plants. Therefore, boiling heat transfer plays a very important role for a wide number of applications in many technological and industrial areas, including energy production. As an example, subcooled boiling heat transfer can accommodate very high heat fluxes, and this can be suitably employed in the cooling of some components for fusion reactors, where it is required to remove up to 10-15 MW/m². Furthermore, very compact heat exchangers can be manufactured thanks to the high heat transfer rate obtained with boiling heat transfer. Steam generators can be better designed if the boiling process is known in details, thus improving the thermal cycle and the plant efficiency.

The objective of this course was to provide the participants with today's detailed knowledge on the boiling heat transport mechanisms based on recent research results and the most updated methods for the prediction of boiling heat transfer, its enhancement, and its applications to technological and industrial areas. Application to compact heat exchangers was dealt with special care, in view of the industrial interest towards this component, and the very recent application of boiling heat transfer to microscale, including microstructured surfaces, which allow very high heat transfer rates for specific applications, were treated in great detail.

The course has been hosted Heat Transfer Research Inc., a well-known industrial research and development

consortium founded in 1962, with over 700 member companies from around the world and extensive experience in training (www.htri.net). It was addressed to scientists, professionals, engineers and graduate students in the several fields of Engineering, Applied and Fundamental Sciences with specific interest in phenomena involving boiling (process industry, refrigeration industry, energy production, heat exchanger manufacturers, etc.) who want to get acquainted with the traditional background and the most recent developments of this discipline.

This course has been held annually since 2005 with a large participation, and will be repeated again in Lausanne, Switzerland, on 6-10 October 2008 (for information contact the next course coordinator, Prof. J. Thome, john.thome@epfl.ch). The six lecturers are recognized experts in boiling heat transfer; the content of their lectures follows.

Paolo Di Marco (Course Coordinator, 7 lectures) is Professor of Engineering Thermodynamics and Heat Transfer, Department of Energetics, Faculty of Engineering, University of Pisa. *Lectures content:* Generalities on pool boiling: boiling curve, phase equilibria, transport properties and equations; surface tension, equilibrium on a curved interface. Basic mechanisms in nucleate pool boiling: nucleation, bubble growth in the fluid and at the wall, bubble detachment, Marangoni convection. Heat transfer mechanisms in nucleate boiling. Nucleate boiling correlations. Critical heat flux in pool boiling: mechanisms and correlations. Parametric effects in boiling; effect of force fields: gravity and electric field.

Gian Piero Celata (7 lectures) is Director of the Institute of Thermal-Fluid Dynamics at the Italian

national research center ENEA. *Lectures content:* Generalities on flow boiling, flow regimes, void fraction, two-phase frictional pressure drop, subcooled and saturated flow boiling in circular tubes, critical heat flux in subcooled flow boiling, critical heat flux in saturated flow boiling, predictions methods for the subcooled flow boiling CHF: correlations and mechanistic models, predictions methods for the saturated flow boiling CHF: correlations and mechanistic models, post-CHF heat transfer, augmentation of CHF and post-CHF heat transfer, boiling of mixtures, flow boiling in microgravity.

R. Stanley Kistler (2 lectures) HTRI Vice President, Research and Software Development. *Lectures content:* Post-CHF regimes: transition boiling and film boiling; fundamentals and parametric effects; dry patches; minimal heat flux; correlations and mechanistic models, predictions methods, practical examples.

Peter Stephan (7 lectures) is Professor of Technical Thermodynamics and head of the eponymous institute at Darmstadt University of Technology. *Lectures content:* Microscale and multiscale modelling approaches to predict pool boiling heat transfer. Description of transport phenomena on different scales (from nano- to macroscale). Experimental studies aiming at the evaluation of microscale phenomena and the validation of micro- and multiscale models. Boiling in microstructured surfaces. Thermocapillary instability of falling evaporative films. The use of microstructured

surfaces to increase the evaporation rate and prevent a local dryout.

John R. Thome (6 lectures) is Professor of Heat and Mass Transfer at the Swiss Federal Institute of Technology in Lausanne (EPFL), Switzerland. *Lectures content:* Flow patterns map in horizontal and vertical tubes, heat transfer models based on flow patterns, pool boiling in liquid mixtures, forced convective boiling in liquid mixtures, critical heat transfer in liquid mixtures, models for heat transfer in pool and flow boiling of mixtures, flow boiling in microchannels, differences between microscale and macroscale in flow boiling in tubes, flow patterns in microchannels, modelling of flow boiling in microchannels.

Vishwas V. Wadekar (6 lectures) is Technology Director, HTFS Research at Aspen Technology Ltd. *Lectures content:* Passive and active methods, flow boiling in advanced geometries, flow boiling in compact heat exchangers: evaluation of the boiling heat transfer performances of different compact heat exchangers, flow boiling in multichannels, flow boiling instabilities, external flow boiling in tube bundles.

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The 1st International Colloquium on Dynamics, Physics and Chemistry of Bubbles and Gas-Liquid Boundaries (ICBB2007) September 25–28, 2007, Niseko, Japan

by Toshiyuki Sanada

The 1st International Colloquium on Dynamics, Physics, and Chemistry of Bubbles and Gas-Liquid Boundaries (ICBB2007) was held during 25-28 September, 2007 in Niseko, Hokkaido, Japan. The colloquium was organized by Professor S. Fujikawa (Japan), the chair and Dr. J. Magnaudet (France), Prof. A. Morita (Japan), Prof. A. Prosperetti (USA) and Prof. J. Thome (Switzerland), the co-chairs, for the purpose of summarizing the state-of-the-art development of dynamics, physics and chemistry of bubbles and gas-liquid boundaries and shedding light onto their problems for the future.

In the colloquium, 35 lectures each followed by an intensive discussion were made among 45 specialists in friendly and enthusiastic atmosphere in a single room. The lectures consisted of 4 lectures of 1 hour each given by guest speakers; Prof. A. Prosperetti, Prof. J.



Commemorative photo of ICBB2007

Magnaudet, Prof. B. C. Garrett (USA), and Prof. T. Yano (Japan), and 31 general lectures of 30 minutes each on

- (1) Bubbly Flows in Microscales
- (2) Shock-Bubble Interactions
- (3) Bubble Motions
- (4) Bubble Physics



A scene of one of the sessions

(5) Vapor-Liquid Interfaces

(6) Droplets, Microbubbles, Coastal Breaking Wave

The colloquium covered a wide spectrum of research field in multiphase flow, including bubbly flow in micro-scale, interaction between shock wave and bubble, non-equilibrium phase change on the interface and so on. All the participants stayed in the same hotel, enjoyed conversation and discussion everywhere and all the time, and were fully satisfied with the complete success of the colloquium. For additional information you can contact the chair:

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International Gas Turbine Congress 2007 Tokyo December 2–7, 2007, Shinjuku, Japan

by Toshinori Watanabe

The International Gas Turbine Congress 2007 Tokyo (IGTC'07 Tokyo) was held at Keio Plaza Hotel, Shinjuku, from 2nd to 7th December, 2007. It was the ninth congress organized by the Gas Turbine Society of Japan (GTSJ), concerning gas turbine, turbo-charger, and related technologies. The GTSJ has been continuously hosting the congress since 1971 with the interval of four years.

A total of 147 papers were presented in the technical sessions for various fields of gas turbine related technologies, such as aerodynamics, combustion, heat transfer, materials and structures, system development, production technology, maintenance, environmental issues, and so on.

The technical program featured five keynote speeches (K-S) and an invited lecture presented by world's leading experts.

K-S 1: "The Role of Gas Turbine in the Global Energy and Environmental Resolution"

by Mr. Ichiro Fukue (Mitsubishi Heavy Industries, Ltd.)

K-S 2: "High Fidelity Integrated Numerical Simulations

of Gas Turbine Engines"

by Prof. Parviz Moin (Stanford University)

K-S 3: "Opportunities for Advancing High Temperature Structural Materials"

by Dr. Robert E. Shafrik (GE Aviation)

K-S 4: "Challenges and Technological Chances for the Aero Engine Industry: The European Path Forward" by Prof. Klaus Broichhausen (Bauhaus Luftfahrt e.V.)

K-S 5: "Proactive Approach for Engine Reliability Improvement"

by Mr. Shigehiro Sugiura (Aviation Engineering & Business Consultant)

Invited Lecture: "Educating the Next Generation of Engineers - A Call to Action"

by Dr. David C. Wisler (GE Aviation)

The program also included Forum on the "Current Status and Future Strategy of Electricity and Energy Supply in Asian Countries." At the last stage, the panel discussion entitled "Global Environmental Problems, Energy Consumption and Contribution of Gas Turbine Power Systems" wrapped up the congress.

In conjunction with the technical sessions, the Exhibition provided opportunity to view the latest product and service offering of 39 leading companies and organizations. They displayed current and future versions of gas turbine systems, auxiliary systems, a mock up of small size jet engine, measurement systems, soft wares, etc. The highlight was CF34 turbo fan engine. The panels showing research activities of 12 laboratories in 9 universities were also presented.

IGTC'07 was successfully completed with 500 registrants from 18 countries and 4,000 visitors to the

exhibition. The GTSJ sincerely appreciate collaborating supports from relevant societies and organizations in the world. The next congress will be held in 2011 probably in the west part of Japan.

<http://wwwsoc.nii.ac.jp/gtsj/index.html>

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25th Zurich Short Courses on Modelling and Computation of Multiphase Flows February 11–15, 2008, Zurich, Switzerland

by George Yadigaroglu

The Zurich Short Courses on Multiphase Flows have celebrated this year their 25th edition, hosted as usual by ETH Zurich. A record number of participants attended this year, mainly from Europe but in increasing numbers also from America (US and Canada), North and South Africa, and Asia (Korea and Japan). Although the majority of the participants came from nuclear industries or institutions, there was a wide spectrum of participation from areas as diverse as food processing, bio-medical engineering, the automobile industry, space technology, information technology, building construction, etc., a testimony to the fact that multiphase flows find applications in many industries.

The courses were again offered – at the rate of four 90-minute lectures per day – the first three days as a common module, Part I, followed by two parallel modules (Parts IIA and IIB). Finally all the participants assembled again for Part III.

Given its success in previous years, an introductory "tutorial" text (expanded and completed this year) was emailed to the participants a few weeks before the beginning of the course to familiarize them with the basic material, definitions and nomenclature and bring them to a common basic level, so that they could more easily and effectively follow the course.

Part I, Bases covered the common background material and emphasised the latest mechanistic understanding, modelling and computational aspects of multiphase flows. This part was redesigned again this year in a continuing effort to optimize the course. *Part IIA, New Reactor Systems and Methods*, covered the multiphase phenomena in LWRs, as well as advanced computational modelling of these systems. The latest

developments in modelling and simulation methods for core design and accident analysis were presented. The most recently proposed advanced reactor system designs, including the near-deployment passive LWR systems and those in Generation IV were also briefly reviewed in relation to multiphase flow phenomena taking place in these systems.

Part IIB, the module on *Computational Multi-Fluid Dynamics (CMFD)* was followed by a (majority) of participants who are interested in the application of CFD techniques to multi-phase flows. This part of the course was also redesigned this year with the return of Prof. G. Tryggvason and featured also a new introductory overview lecture by Dr. D. Lakehal. The module covered the main interface tracking methods, as well as other approaches like Lattice Gas Cellular Automata. Numerous examples of applications were given.

Finally in the last common module, *CMFD with Commercial Codes*, the participants had the opportunity to learn, directly from the main commercial code developers, about the multiphase capabilities of their codes, which is constantly improving, as the variety of challenging applications that were tackled worldwide shows.

The participants particularly like the numerous movies, videos, animations, and computer simulations, some classical, some produced very recently, that are shown during the lectures.

The lecturers in this series of carefully organized and coordinated modules are experts in their respective fields, but are selected also for their pedagogical qualities. This year they included: S. Banerjee, D. Bestion, M.L.

Corradini, G. Hetsroni, G.F. Hewitt, D. Lakehal, S. Lo, J.-M. Prasser, G. Scheuerer, G. Tryggvason, S.A. Vasquez, G. Yadigaroglu and S. Zaleski.

The participants receive an extensive set of lecture notes, in addition to handouts produced from the standardised PowerPoint presentations. The exact schedule and contents of the lectures can be found in

the Course web site: <http://www.ascomp.ch/ShortCourse/>.

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Report on the 24th Semiconductor Thermal Measurement and Management Symposium (SEMI-THERM) March 16–20, 2008, San Jose, California, USA

by Ross Wilcoxon

The 24th Annual SEMI-THERM Symposium was held in San Jose, California March 16-20, 2008. The symposium is sponsored by the Institute of the Electrical and Electronics Engineers (IEEE), the Components, Packaging and Manufacturing Technology (CPMT) Society, and the National Institute of Standards and Technology (NIST) and addresses a range of topics related to electronics cooling. The symposium includes a technical program, short courses, and vendor exhibits.

The technical program included a total of thirty-five papers that were presented in eight topical sessions (Two Phase Cooling, Air Cooling, Die Level Cooling, Package Level Cooling, System Level Cooling, Liquid Cooling, Data Center Thermal Management and Test Methods) and a poster session. The technical program began with a keynote presentation on "Computer Architecture Implications of Multi-Core Processors", by Mike Vildibill of Sun Microsystems that described how the changing landscape of computer architectures impacts hardware engineering. Another highlight of the technical program was a very informative embedded tutorial on Thermal Interface Materials by Dr. Ravi Prasher of Intel. Of the many interesting papers that were presented, three finalists for the 'Best Paper' award were identified. The paper "*Transient Measurement of the Junction-To-Case Thermal Resistance Using Structure Functions: Chances and Limits*" by Dirk Schweitzer, Heinz Pape, and Liu Chen of Infineon Technologies received the Best Paper award. The other two finalists for this award were "*Synthetic Jet Cooling Part II: Experimental Results of an Acoustic Dipole Cooler*" by Clemens Lasance, Ronald Aarts, and Okke Ouweltjes of Philips Research Laboratories and "*Flow Boiling in Silicon Microchannel Heat Sinks*" by Tannaz Harichian and Suresh Garimella of Purdue University.

SEMI-THERM consistently includes a strong supporting program with invited speakers as well as highly relevant short course presentations. This year's short courses included: "*Unlearning the Myth of Cooling Electronics*" by Tony Kordyban, "*Ultrahigh-Thermal-Conductivity Packaging Materials*" by Carl Zweben, "*Thermal Characterization of Electronic Packages*" by Bruce Guenin, and "*Integrated Design Approach for Thermal and EMI*" by Mark Heerema and Herman Chu. Other invited presentations made during the conference included a very interesting evening tutorial on "*Acoustic Considerations for Fan Selection*" by Herman Chu of Cisco Systems as well as two very well received luncheon presentations: "*The History of Liquid-Cooling at IBM*" by Bob Simons of IBM and "*Technology and Discovery on the Ocean Frontier*" by Dr. James Bellingham of the Monterey Bay Aquarium Research Institute.

Two industry awards were presented during SEMI-THERM 24. The Significant Contributor "THERMI" Award was presented to Prof. Dereje Agonafer of the University of Texas at Arlington and the Massachusetts Institute of Technology for his extensive contributions to the field of electronics cooling and packaging. As part of the technical program, Prof. Agonafer gave an invited presentation on "*Thermomechanical Challenges in Electronic Packaging*". In addition, the Harvey Rosten Award 'For Excellence In the Physical Design of Electronics' was given to Prof. Ari Glezer of the Georgia Institute of Technology and Dr. Raghav Mahalingam of Nuventix, Inc. for their work in synthetic jet technologies.

The 25th Annual SEMI-THERM Symposium will be held in San Jose, California in March 2009. The General Chair for SEMI-THERM 25 is George Meyer of Celsius Technologies while the Program Chair is Attila

Aranyosi of Electronic Cooling Solutions. Information on conference may be found at <http://www.semi-therm.org/>.

Dr. Ross Wilcoxon

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International Conference on Multiphase Flow (ICMF 2007) July 9–13, 2007, Leipzig, Germany

by Akiko Fujiwara

In July 9th to 13th, 2007, International Conference on Multiphase Flow (ICMF) was held in Leipzig, Germany. It was one of the large international conferences including more than 500s of oral presentation and 100s of posters. Author also attended in a poster session.

In oral sessions, there were many presentations about bubble behavior and bubble-bubble interaction. Investigation about bubbles is chief object of interest in these days. Especially, many studies of spiral or zigzagging motion of deformed bubbles and the wake structure of them were presented. Visualization measurement of wake structure with fluorescent dye and PIV (Particle Image Velocimetry) measurement with high accuracy were introduced as experimental studies. As numerical studies, the wake structure behind single bubble and wake interaction induced by bubbles were introduced. There were lively discussions supported by accurate experiment and sophisticated simulation.

There was session about microfluidics which author investigates for a whole day. Most studies are proposed about multiphase flow structure in adiabatic system. They were reported about the potential to reproduction of the multiphase flow regime in micro scale experimentally. And also the effect of wettability in a microchannel was reported.

Prof. Yoichiro Matsumoto made a presentation as a plenary talk. The title of his talk was "Medical application of micro-bubbles". He discussed the potential of microbubbles for medical application as contrast agent for diagnostics and treatment by using

the physical competence of microbubbles. In the present conference, there were several presentations about medical application of multiphase flow. Most interest topics were about flow in trachea and nasal cavity in this session. The behavior of particles as dust or medicine in trachea was investigated in both simulation and experiment point of view.

The present conference is excellent in terms of gathering of updated and high quality topics of multiphase flow. And also many renowned researchers are gathered. It is favorable opportunity for young researchers to join and discuss with them.

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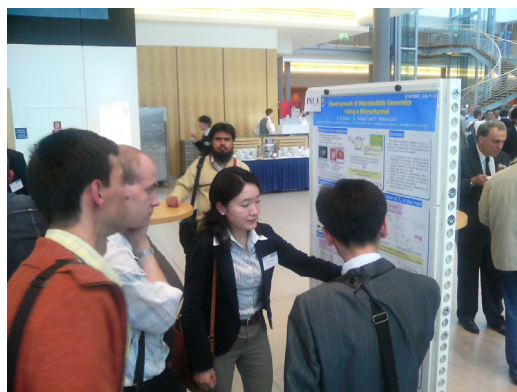


Fig. Author explaining her poster for audiences.

An Announcement from Editor

The JSMF gives internet-service for ICMF members.
You can read updated ICeM NEWSLETTER by visiting JSMF homepage
<http://www.jsmf.gr.jp/index-en.htm>

Future Meetings

Following list includes Conference Name, Place, Date and Contact.

10th World Filtration Congress (WFC10)

Leipzig, Germany, April 14-18, 2008
Dr. Harald Anlauf, University of Karlsruhe
Filtech Exhibitions Germany
PO Box 12 25, 40637 Meerbusch - Germany
Tel: +49 (0)2132 93 57 60
Fax: +49 (0)2132 93 57 62
E-mail: info@wfc10.com
<http://www.wfc10.com/>

THICKET-08 Seminar on Transfer of Competence, Knowledge and Experience Gained through CSNI Activities in the Field of Thermal-Hydraulics

University of Pisa, Italy, May 5-9, 2008
Prof. Alessandro Petrucci
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<http://www.nea.fr/html/nsd/workshops/thicket-2008/>

16th International Conference on Nuclear Engineering (ICONE-16)

Orlando, Florida, USA, May 11-15, 2008
Dr. David Torgerson, Atomic Energy of Canada Limited (AECL), Canada
Dr. Masatake Higashi, Central Research Institute of Electric Power Industry, Japan
<http://www.asmeconferences.org/icone16/>

Fundamentals of Microscale Heat Transfer: Boiling, Condensation, Single- and Two-phase Flows

Lausanne, Switzerland, June 2-6, 2008
Prof. John R. Thome
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http://termserv.casaccia.enea.it/mht_course/

2008 International Congress on Advances in Nuclear Power Plants (ICAPP '08)

Anaheim, California, USA, June 8-12, 2008
Dr. Amir Shahkarami, Exelon Nuclear-USA
Dr. Jean Claude Gauthier, AREVA-France
Dr. Akio Tsuji, Hitachi-Japan
Dr. Myung-Jae Song, KHNP-Korea
E-mail: icapp@ans.org
<http://www.inspi.ufl.edu/icapp08/>

1st International Symposium on Thermal Design and Thermophysical Property for Electronics (e-Therm)

Tsukuba, Japan, June 18-20, 2008
Dr. Tetsuya Baba, Japan

National Institute of Advanced Industrial Science and Technology (AIST)

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<http://www.nmij.jp/~mprop-stats/e-therm/>

The 4th International Symposium on Energy, Informatics and Cybernetics (EIC 2008)

Orlando, Florida, USA, June 29 - July 2, 2008
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Orlando, Florida 32837, U.S.A.
<http://sciiis.org/EIC2008>

6th International Conference on Heat Transfer, Fluid Mechanics and Thermodynamics (HEFAT2008)

University of Pretoria, Pretoria, South Africa, June 30 - July 2, 2008
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Fax: +27 12 362 5124
<http://www.africaspecials.com/hefat2008/>

The 5th International Conference on Transport Phenomena in Multiphase Systems (HEAT 2008)

Bialystok, Poland, June 30 - July 3, 2008
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Tel: (+48)(85)-746-92-76
Fax: (+48)(85)-746-92-10
<http://www.heat2008.pb.edu.pl/>

The 13th International Symposium on Flow Visualization (ISFV-13)

Nice, French Riviera, France, July 1-4, 2008
Prof. Jean Pierre Prenel, University of Franche-Comté
Prof. Yannick Bailly, University of Franche-Comté
Prof. Jean Claude Champoussin, ECL
Fax: 33 384 57 00 32
E-mail: isfv13@univ-fcomte.fr
<http://isfv13.univ-fcomte.fr/>

19th International Symposium on Transport Phenomena (ISTP-19)

Reykjavik, Iceland, August 17-21, 2008
Prof. Sigurdur Brynjolfsson, University of Iceland, Iceland
E-mail: sb@hi.is

Prof. Jong H Kim, EPRI International/KAIST, USA
E-mail: jkim@epri.com
<http://www.istp-19.org>
or <http://www.hi.is/ISTP-19>

18th European Conference on Thermophysical Properties

Pau, France, August 31 - September 4, 2008
Prof. J.L. Daridon, University of Pau
Fax: +33 559 40 76 95
E-mail: ectp@univ-pau.fr
<http://ectp.univ-pau.fr/>

11th International Conference Multiphase Flow in Industrial Plant (MFIP '08)

Palermo, Italy, September 7-10, 2008
Prof. Alberto Brucato, Università di Palermo
+39 091 6567216
Dr. Gian Piero Celata, Enea Casaccia, Roma
+39 06 3048 3905
E-mail: mfip2008@dicpm.unipa.it
<http://www.animp.it/MFIP2008/index.html>

Two-phase Convective Boiling Flow Modelling

Grenoble, France, September 8-9, 2008
E-mail: n.sheibani@shf.asso.fr
<http://shf.asso.fr/diphastique/Index-Eng.html>

Experiments and CFD Code Applications to Nuclear Reactor Safety, XCFD4NRS

Grenoble, France, September 10-12, 2008
Dr. Dominique Bestion
Commissariat à l'Energie Atomique (CEA), France
E-mail: dominique.bestion@cea.fr

The 2nd International Conference on Jets, Wakes and Separated Flows (ICJWSF-2008)

Technical University Berlin, Berlin, Germany, September 16-19, 2008
Prof. Dr. Christian Oliver Paschereit, Technical University Berlin, Germany
Prof. Dr. Toshihiko Shakouchi, Mie University, Mie, Japan
Prof. Dr. Ephraim J. Gutmark, University of Cincinnati, USA
Tel: +49-(0)30-31423471
E-mail: icjwsf@fd.tu-berlin.de
<http://www.fd.tu-berlin.de/icjwsf>

The Second International Forum on Heat Transfer (IFHT2008)

Tokyo, Japan, September 17-19, 2008
Prof. Satoh, I., Tokyo Inst. Tech., Japan
Prof. Ishizuka, M., Toyama Pref. Univ., Japan
E-mail: ifht2008@isc.meiji.ac.jp
<http://www.isc.meiji.ac.jp/~ifht2008/>

Heat Transfer and Fluid Flow in Microscale-III

Whistler, BC, Canada, September 21-26, 2008
Dr. Gian Piero Celata, ENEA, Italy

E-mail: info@eci.poly.edu
<http://www.engconfintl.org/8aj.html>

International Topical Meeting on Safety of Nuclear Installations (ENS TOPSAFE 2008)

Dubrovnik, Croatia, October 1-3, 2008
Dr. Kirsten Epskamp, European Nuclear Society
Tel: +32 2 505 30 58, Fax: +32 2 502 39 02
E-mail: topsafe2008@euronuclear.org
<http://www.topsafe2008.org/>

The 7th International Topical Meeting on Nuclear Reactor Thermal Hydraulics, Operation and Safety (NUTHOS-7)

Grand Intercontinental Hotel, Seoul, Korea, October 5-9, 2008
Dr. Jong H. Kim, KAIST- EPRI WW
Prof. Hisashi Ninokata, TITech
E-mail: info@nuthos7.org
<http://www.nuthos-7.org>

The 7th JSME-KSME Thermal and Fluids Engineering Conference (TFEC2008)

Sapporo, Japan, October 13-16, 2008
Prof. Kazuhiro Kudo (JSME)
E-mail: myamada@eng.hokudai.ac.jp
Prof. Jinho Lee (KSME)
E-mail: hhcho@yonsei.ac.kr
<http://www.tfec2008.jp/>

The 16th Pacific Basin Nuclear Conference (16PBNC)

Aomori, Japan, October 13-18, 2008
Dr. Shunsuke Kondo, Atomic Energy Commission of Japan
E-mail: info@pbnc2008.org
<http://www.pbnc2008.org/>

Winter Meeting and Nuclear Technology Expo

Reno, NV, USA, November 9-13, 2008
Dr. David J. Hill, Idaho National Laboratory
<http://www.ans.org/meetings/index.cgi?c=n>

6th Japan-Korea Symposium on Nuclear Thermal Hydraulics and Safety (NTHAS-6)

Okinawa, Japan, November 24-27, 2008
Prof. K. Sugiyama, Hokkaido Univ.
Prof. K. Y. Suh, SNU
E-mail: okamoto@nthas6.org
<http://www.nthas6.org/>

1st European Conference on Microfluidics (mFluâ08)

Bologna, Italy, December 10-12, 2008
Prof. Gian Luca Morini, University of Bologna, Italy
E-mail: gianluca.morini@mail.ing.unibo.it
Prof. Stephane Colin, University of Toulouse, France
E-mail: stephane.colin@insa-toulouse.fr
<http://www.microfluidique.insa-toulouse.fr/mf08.htm>

Second International Conference on Thermal Issues in Emerging Technologies Theory and Application - ThETA 2

Cairo, Egypt, December 17-20, 2008
Prof. Moustafa Awad, Mansoura University, Egypt
Prof. Ossama Shawki, French University in Egypt, Egypt
E-mail: thetacnf@gmail.com
<http://www.thetacnf.org/>

Boulder, Colorado, USA, June 23-26, 2009
Dr. Piotr A. Domanski, NIST, Gaithersburg, Maryland
Dr. Mark O. McLinden, NIST, Boulder, Colorado
100 Bureau Dr. Mail Stop 8631
Gaithersburg, MD 20899-8631
Tel: 301 975-5868, Fax: 301 975-8973
E-mail: david.yashar@nist.gov
<http://www.iirboulder2009.org>

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7th ECI International Conference on Boiling Heat Transfer (BOILING 2009)

Florianópolis-SC, Brazil, May 3-7, 2009
Prof. Júlio César Passos
University Federal of Santa Catarina
Department of Mechanical Engineering
Florianópolis-SC, Brazil
Tel: +55 48 3721 9379 (217)
Fax: +55 48 3721 7615
E-mail: jpassos@emc.ufsc.br
<http://www.boiling2009.com.br/>

7th World Conference on Experimental Heat Transfer, Fluid Mechanics and Thermodynamics (ExHFT-7)

Krakow, Poland, June 28 - July 3, 2009
Prof. Dieter Mewes
E-mail: exhft-7@agh.edu.pl
<http://www.exhft-7.agh.edu.pl/>

13th International Topical Meeting on Nuclear Reactor Thermal Hydraulics (NURETH-13)

Kanazawa, Japan, September 27 - October 2, 2009
Prof. Neil E. Todreas, MIT
Dr. Hideki Nariai, JNES
Prof. Jong H. Kim, KAIST/EPRI-W.W.
<http://www.nureth13.org/>

ANS Annual Meeting

Atlanta, GA, USA, June 14-18, 2009
<http://www.ans.org/meetings/index.cgi?c=n>

ANS Winter Meeting and Nuclear Technology Expo

Washington D.C., USA, November 15-19, 2009
<http://www.ans.org/meetings/index.cgi?c=n>

The Third Conference on Thermophysical Properties and Transfer Processes of Refrigerants

Executive Division of The Japanese Society for Multiphase Flow (2007-2008)

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