



The International Information Center for Multiphase Flow

NEWSLETTER

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The Japanese Society for Multiphase Flow

**The 7th International Symposium on Fluid Control, Measurement and Visualization
August 25-28, 2003, Sorrento, Italy**

by Carlomagno, G M.

Abstract: The 7th International Symposium on Fluid Control, Measurement and Visualization (FLUCOME'03) was held in Sorrento, Italy, from the 25th to the 28th of August 2003. The Symposium attracted, by far, one of the largest number of participants in the history of the meeting. The 232 presented papers were distributed in 52 Technical Sessions which covered the very broad range of topics indicated in the Keywords.

At the beginning of each working day, a speaker, selected among renowned specialists, delivered an authoritative lecture in Plenary Session. Prof. W. Merzkirch discussed *Fluid Mechanical Problems in Flow Metering*, Prof. C. J. Chen described *Some Aspects of Nanotechnology, Microtechnology and Biomedical Applications*, Dr. A. Cogotti treated *From Steady-State to Unsteady Aerodynamics and Aeroacoustics. The Evolution of the Testing Environment in the Pininfarina Wind Tunnel* while Prof. B. T. Zinn reported on *The Real Time Control of the Lean Blow Out Limit in Pre-Mixed Combustors for Reduced NOx Emissions*. On the last day, Prof. A. Tamir entertained the audience by considering the interaction between art and science.

Keywords: *Aerodynamics, Bioengineering, CFD Applications, CFD Methods, Combustion, Compressible Flows, Cylinder Flows, Flow Control, Flow Measure-*

ments, Flow Metering, Flow Visualization, Fluidics, Heat Transfer in External Flows, Heat Transfer in Internal Flows, Hydraulics, Jets, Machine Flows, Micro Flows, Mixed Convection, Natural Convection, Optical Methods, Particle Image Velocimetry, Pneumatic Components, Pneumatics, Separated Flows, Synthetic Jets, Tunnel Testing, Turbulence, Two Phase Flows, Unsteady Aerodynamics.

The 7th International Symposium on Fluid Control, Measurement and Visualization (FLUCOME'03) was the latest in the well established series of FLUCOME International Symposia. The first FLUCOME conference was held in Japan in 1985. Since then, it has been held every three years at various places in the world including: Sheffield (United Kingdom), San Francisco (USA), Toulouse (France), Hayama (Japan) and finally Sherbrooke (Canada). The objective of the Symposium is to provide a forum for communication and information exchange in the broad field of fundamental aspects of fluid flow.

The Symposium was organized by the University of Napoli Federico II. The University of Napoli dates back to the year 1224, when Federico II of Swabia, heir of both the Roman-German Empire and the Kingdom of Sicily, decided to create an institution whose main aim was to build up a strong and skilful team of experts

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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to assist in ruling over his huge empire which included Southern and Northern Italy, Switzerland, Austria, Germany, Netherlands, Belgium, Czechoslovakia, Eastern and Southern France.

Federico II, named *marvel of the world* because of his wide knowledge and broad interests, was multilingual from childhood, understanding Latin, Greek, Italian and Sicilian dialects, German, Arab and Hebrew; he was a very clever and stubborn emperor, but also a poet, an amateur philosopher, interested in astrology, geography and science.

FLUCOME'03 was held in Sorrento, Italy, from the 25th to the 28th of August 2003. The 7th Symposium attracted, by far, one of the largest number of participants in the history of the meeting. More than 300 scientists, coming from the five continents and specifically from about 30 countries all over the world, plus over 70 accompanying persons, attended the Symposium. The majority of the participants came from Japan, Italy, United Kingdom, United States of America, Korea, Germany and France.

The success of the Symposium has to be mainly ascribed to the patient work of the members of the International Steering Committee which included many distinguished scientists in the broad field of fluid flow. This is the best opportunity to thank all of them once again.

The popularity of the meeting is a true reflection of the growing importance of fluid flow research and of the ability of its practitioners, as demonstrated by the CD ROM Proceedings (ISBN 0 9533991 4 1) which was edited by me and Prof. Ian Grant of Heriot-Watt University. The Proceedings took full advantage of the powerful electronic image capture and manipulation tools which have lately become available and are now central in the work of many scientists.

In the CD ROM Proceedings, an editorial step forward by using new developments in electronic publishing was taken to give authors the opportunity to present their work in full colour and to include some moving images. Since the fluid flow speciality largely embodies visual observation of dynamic processes, the digital images, gave the opportunity to convey an immediate impression both of the science and the excitement, experienced by the researchers in their individual endeavours. The CD publication clearly illustrated both the high quality of the submission and the blurred position between art and science which the fluid flow research holds.

The use of the electronic communication and media for conference paper submission and program development also allowed for a high level of dialogue between participants and editors making possible, for the resulting proceedings, a degree of homogeneity in paper appearance which normally would be attainable only in a journal environment.

The 237 papers, from many of the world's leading laboratories, which are contained in the CD ROM, are

indexed and the full text is searchable for keywords or according to the Symposium Program. An archive copy of the CD is lodged in the National Library of Scotland. Anyone interested in obtaining a copy of the CD ROM Proceedings of FLUCOME'03 may contact: ian@igrant.demon.co.uk.

The Symposium actually commenced on Sunday night, August 24, with a warm Welcome Reception, which was held in the Hilton Sorrento Palace Hotel where all the participants had the chance to meet old friends and/or to make new acquaintances.

The Opening Ceremony was held on Monday, August 25, early in the morning, with a hearty welcome from the Dean of the Faculty of Engineering of the University of Naples Federico II, Prof. Vincenzo Naso, who conveyed also the greetings of the Rector of the University.

At the beginning of each working day, a speaker, selected among renowned specialists in different fields of fluid flow, delivered an authoritative lecture in Plenary Session. Prof. Wolfgang Merzkirch of University of Essen discussed *Fluid Mechanical Problems in Flow Metering*, Prof. Ching-Jen Chen of Florida A & M University described *Some Aspects of Nanotechnology, Microtechnology and Biomedical Applications*, Dr. Antonello Cogotti of Pininfarina Industries treated *From Steady-State to Unsteady Aerodynamics and Aeroacoustics. The Evolution of the Testing Environment in the Pininfarina Wind Tunnel* while Prof. Ben T. Zinn of Georgia Institute of Technology reported on *The Real Time Control of the Lean Blow Out Limit in Pre-Mixed Combustors for Reduced NOx Emissions*. On the last day, Prof. A. Tamir of Ben-Gurion University of the Negev entertained the audience by considering *The Interaction Between Art & Science: From Mona Lisa to Einstein*.

Prof. W. Merzkirch addressed two major problems in flow metering, the first one concerning the generation of the signals that are processed to obtain the values of the volumetric flow rate and the second one regarding the performance of a flow meter in a not-fully developed flow. Two examples were discussed in detail.

Prof. C. J. Chen described some aspects of the development in micro systems using magnetic nano particles to detect biological components for medical and clinical use. The magnetic nano particles were encapsulated in a specific protein that mixed in the fluid solution. The advances in micro devices such as micro-pumps was also treated.

Dr. A. Cogotti reported on the continuous development of the testing environment in the Pininfarina wind tunnel which allows investigations on full scale car models. He treated the problems of having a rolling road under the car, of decreasing the overall tunnel noise so as to perform acoustic measurements and of reproducing the real on-road conditions including a controlled level of turbulence.

Prof. B. T. Zinn discussed an active control sys-

tem, to detect lean blow-out precursors and to stabilize the combustor behaviour while maintaining low NOx emissions, based on optical and acoustic measurements. The control redistributes the fuel between the main premixed flow and a pilot injector and can accommodate also variations in flow conditions.

The fifty two Technical Sessions held during the Symposium covered the following topics: *Aerodynamics, Bioengineering, CFD Applications, CFD Methods, Combustion, Compressible Flows, Cylinder Flows, Flow Control, Flow Measurements, Flow Metering, Flow Visualization, Fluidics, Heat Transfer in External Flows, Heat Transfer in Internal Flows, Hydraulics, Jets, Machine Flows, Micro Flows, Mixed Convection, Natural Convection, Optical Methods, Particle Image Velocimetry, Pneumatic Components, Pneumatics, Separated Flows, Synthetic Jets, Tunnel Testing, Turbulence, Two Phase Flows, Unsteady Aerodynamics.*

Finally, on Friday August 29, many participants spent a delightful day cruising in the bays of Naples and Salerno. The yacht departed from Sorrento harbour and, amongst other things, made stops at Faraglioni rocks of Capri, "li Galli" islands and Positano. A "marinara Neapolitan lunch" was served on board.

During its Sorrento assembly, the FLUCOME International Steering Committee decided that, from now on, the Symposium will occur on a biennial basis (i.e. every two years and not every three as it was before) and that the 8th International Symposium will take place in Chengdu, China, from the 22nd to the 25th of August 2005. Chengdu is the capital of Sichuan Province which is the home to giant panda and 85% of these animals are found in the habitat of the northwest mountains of this region.

The Symposium Chairman is Prof. Qing-Ding Wei of Peking University who is already actively working to repeat, if not to improve, the success of Sorrento's

meeting. Further information is available by contacting qdwei@pku.edu.cn.

Therefore, let me say to all the participants in the 7th Symposium: *Arrivederci in Chengdu on 2005 for the 8th FLUCOME Symposium.*

Author's Profile: Giovanni Maria Carlomagno: He became Doctor in Mechanical Engineering (summa cum laude) in 1965, Research assistant at University of Princeton (1967-68), Associate Professor of Physics (1969), Associate professor of Gas Dynamics (1975), Professor of Aerospace and Mechanical Engineering (1986). He chaired over 20 International Meetings, is editor of about 20 books and author of some 250 scientific papers on Aerodynamics, Gasdynamics, Heat transfer, Fluidics, Non-newtonian fluid dynamics, Measurement techniques in thermo-fluid-dynamics, Tethered satellites, Infrared thermography, PIV, Image Processing. He is Member of the Advisory Board of the Pacific Center of Thermal-Fluids Engineering, the Scientific Council of the International Centre for Heat and Mass Transfer and of the Executive Committee of the International Council of Aeronautical Sciences. Member of the Editorial Board of more than 10 International Scientific Journals and Deputy Chairman of the Technical Advisory Committee of the von Karman Institute, he is also the Dean of the Aerospace Engineering School of the University of Naples Federico II.

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Report on International Conference on 'Hydrocarbon flow measurement' September 22-24, 2003 - FCRI, Palakkad, Kerala, India

by Dr.V.Jayaraman, Convenor

The Conference on the Hydrocarbon flow measurement was held during 22-24 September '03 at FCRI, Palakkad, Kerala, India, organised jointly with the support of M/s Petroleum India International, (PII) Mumbai, India.

This conference has been chosen to disseminate informations on various measurement techniques practiced in hydrocarbon flow industries and to promote an exchange of technical, research & experience within the industries of oil/gas connected to the hydrocarbon, and to serve as a common platform to scientists, engineers & other field engineers.

More than 250 delegates from various countries participated in the conference. More than 50 papers

were read during the Conference in 16 technical sessions spread over 3 days. Chairmen of Technical Sessions were formed from flow experts drawn from Hydrocarbon sectors both in India and abroad. There was an exhibition of flow products consisting of 20 Stalls wherein the manufacturers, industries and other flow related agencies had displayed their products which attracted large crowds and response during this conference. On the concluding day, there was a technical panel discussion.

The technical papers were interesting, posed several problems being faced by Hydrocarbon flow industries and most of the papers were applied in nature. This conference has brought users and technologists

working in the flowmetering area together where each presentation attracted lively discussions from the participants. This technical proceedings are available on chargeable basis.

The majority of Delegates were from organisations like ONGC, HPCL, IOCL, BPCL, GAIL and manufacturers of flow products for hydrocarbon industries and all of them were expressing their satisfaction on the arrangements made for the conference, the technical coverage and the interest shown by the participants who had taken part in the technical session etc.

The Technical Panel recommended on the following aspects : The mobile prover for testing accuracy of CNG dispensers used for automotive sectors at various locations. Facility for 60 bar (air/gas) high pressure. Detailed study on the effects of acoustics on performance of flowmeters. More emphasis on the emerging transducer technology of Ultrasonic flowmeter. Closer interaction of FCRI with oil/gas industries. To create awareness amongst the manufacturers/users in hydrocarbon sector about the constant/periodical calibration to ensure accuracy in flowmetering.

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**International Conference on Power Engineering (ICOPE-03)
November 9-13, 2003, Kobe, Japan**

by Terushige Fujii

The 6th International Conference on Power Engineering-03, Kobe (ICOPE-03) was held on November 9 to 13 at the International Conference Center Kobe by the Conference Committee organized jointly by the JSME, ASME, and CSPE. The ICOPE was first held in Tokyo in 1993, followed every 2 years by Shanghai(China), Tokyo(Japan), San Francisco(USA), and Xi'an(China).

The papers collected here include those on a broad spectrum of power engineering topics that range from practical approaches for improved operation and maintenance at existing power plants to advanced technologies at leading-edge research facilities. Furthermore, clean energy sources such as windmills and fuel cells are discussed for environmental protection. This program consisted of special lectures, technical sessions, technical tours, and an exhibition. A total of 227 technical presentations were made in six session rooms over a three-day period, featuring presenters from 15 countries. The total number of the attendees was 434, including 77 participants from abroad. In particular, those from China numbered 41.

The ICOPE-03 proceedings will be bound in three volumes that include all the presentations. The three special lectures were titled "The US Electrical Power Industry - 2003 Perspective" by Mr. William Stenzel, "Pollutants Formation and Control during Coal and Waste Combustion for Power Generation" by Dr. Kefa Cen, and " Power Plants for the 21st Century" by Dr. Shozo Kaneko respectively on behalf of the ASME, CSPE, and JSME. Furthermore, 12 keynote lectures were given at the beginning of the sessions.

Half-day tours were organized to visit the 180 MW LNG-Fired Power Station of the Kansai Electric Power Co., Inc. and the 700 MW Coal-Fired Power Station of Kobe Steel, Ltd. On the last day, 13th November, a full-day technical tour was arranged by bus to visit the Himeji LNG Terminal of Osaka Gas Co., Ltd, the Himeji No.1 Power Station of the Kansai Electric Power Co., Inc., the Takasago 330 MW Gas Turbine Combined Cycle Power Plant of Mitsubishi Heavy Industries, Ltd., and the Akashi New 20 MW Gas Turbine Cogeneration Plant of Kawasaki Heavy Industries, Ltd. , including a visit to the Himeji Castle (a world cultural heritage site).

A technical exhibition also was held in the Kobe Chamber of Commerce Industry Hall, which adjoins the International Conference Center Kobe. There were about 25 exhibition booths such as for fuel cells, micro-gas turbines, and hydrogen generators in addition to the latest power engineering technologies.

Finally, the next 7th conference in the series (ICOPE-05) will take place in the USA in 2005. Even more active participation is expected.

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An Announcement from Editor

The JSME gives internet-service for ICMF members.

You can read updated ICeM NEWSLETTER by visiting JSME homepage

<http://www.jsmf.gr.jp/index-en.htm>

Future Meetings

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

CHT-04: International Symposium on Advances in Computational Heat Transfer

Kirkenes and Bergen, Norway, April 19-24, 2004
Professors Graham de Vahl Davis
Professors Eddie Leonardi
School of Mech. & Manuf. Engineering
The University of New South Wales
Sydney NSW AUSTRALIA 2052
Tel: +61 2 9385 4099
Fax: +61 2 9663 1222
Email: cht04@cfm.mech.unsw.edu.au
<http://cht04.mech.unsw.edu.au/>

15th International Symposium on Transport Phenomena (ISTP-15)

Shangri-La Hotel, Bangkok, Thailand, May 9-13, 2004
Prof. Manabu Iguchi
Hokkaido University, Japan
Dr. Yasushi Sasaki
Acting secretary to the conference chairperson
ISTP-15
Division of Materials Science and Engineering,
Graduate School of Engineering,
Hokkaido University, Sapporo, 060-8628 Japan
E-mail: istp-15@eng.hokudai.ac.jp
<http://rose.hucc.hokudai.ac.jp/~q16648/>

5th Minsk International Heat and Mass Transfer Forum - MIF-2004

Minsk, Belarus, Russia, May 24-28, 2004
Dr. O. Martynenko
Dr. I. Gurevich
A.V.Luikov Heat and Mass Transfer Institute
National Academy of Sciences of Belarus
15, P. Brovka St., Minsk, 220072, Belarus
Tel: +375 (17) 284-21-36
Fax: +375 (17) 232-25-13
Email: igur@hmti.ac.by
<http://www.itmo.by/forum/mif5/>

5th International Conference on Multiphase Flow (ICMF-2004)

Yokohama Pacifico Conference Center,
Yokohama, Japan, May 31- June 3, 2004
Conference Chair
Prof. Y. Matsumoto
University of Tokyo
Email: icmf@jsmf.gr.jp
<http://www.jsmf.gr.jp/icmf/>

International Thermal Science Seminar - ITSS

Grand Hotel Toplice, Bled, Slovenia, June 13-16, 2004
Dr. Art E. Bergles
Rensselaer Polytechnic Institute, USA
E-mail: abergles@aol.com
<http://www.ltt.uni-lj.si/itss2004/>

Second International Conference on Fuel Cell Science, Engineering and Technology

Rochester, NY, USA, June 14-16, 2004
Dr. Ramesh K. Shah
Department of Mechanical Engineering,
Rochester Institute of Technology,
76 Lomb Memorial Drive, Rochester, NY 14623-5604
Tel: (585) 475-7439
Cell: 716-390-9103
Fax: 585-475-7710
E-mail: rkseme@rit.edu
<http://www.asme.org/events/fuelcell/>

ASME TURBO EXPO 2004

Vienna, Austria, June 14-17, 2004
Dr. Sigmar Wittig
German Aerospace Center (DLR)
Koln, Germany
ASME International Gas Turbine Institute
5775-C Glenridge Dr., Suite 115
Atlanta, GA 30328 USA
Tel: 1-404-847-0072
Fax: 1-404-847-0151
E-mail: igtiprogram@asme.org
http://www.asme.org/igti/events/te2004/04committee_topics.html

Second International Conference on Microchannels and Minichannels

Rochester, NY, USA, June 17-19, 2004
Prof. Satish G. Kandlikar
ME Department, R.I.T., Rochester, NY, 14623, USA
Tel: (585) 475-6728
Fax: (585) 475-7710
E-mail: sgkeme@rit.edu
<http://www.asme.org/events/micromini/call.html>

RAD-04: International Symposium on Radiative Transfer

Istanbul, Turkey, June 20-25, 2004
Professor M. Pýnar Mengüç
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<http://www.ichmt.org/Rad-04>

3rd International Conference on Heat Transfer, Fluid Mechanics and Thermodynamics (HEFAT2004)

Cape Town, South Africa, June 21-24, 2004
Prof. JP Meyer
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E-mail: jmeyer@up.ac.za
E-mail: hefat2004@mweb.co.za
<http://www.hefat.com>

12th International Symposium on Applications of Laser Techniques to Fluid Mechanics

Lisbon, Portugal, July 12-15, 2004
Prof. Manuel V. Heitor
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<http://in3.dem.ist.utl.pt/lxllaser2004/>

The First Cappadocia Mechanical Engineering Symposium (CMES-04)

Nigde, Turkey, July 14-16, 2004
Prof. Ibrahim Dincer
School of Manufacturing Engineering
University of Ontario Institute of Technology
2000 Simcoe Street North
Oshawa, Ontario L1H 7K4, Canada
Tel: 905-721-3111 (Ex: 2573)
Cell: 905-441-2229
Fax: 905-721-3140

E-mail: Ibrahim.Dincer@uoit.ca
<http://cmes.nigde.edu.tr/>

2nd Conference on Interfacial Fluid Dynamics and Processes in Physico Chemical Systems

Brussels, Belgium, July 14-17, 2004
Prof. Valentina Shevtsova
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<http://www.ulb.ac.be/polytech/mrc/ima2.html>

Microscale Heat Transfer-Fundamentals and Applications in Biological and Microelectromechanical Systems

Cesme, Izmir, Turkey, July 18-30, 2004
Dr. Sadik Kakac
Department of Mechanical Engineering
University of Miami
Coral Gables, FL 33124, USA
Tel: 305 310-2081
fax: 305 284-2580
Email: c.quintanillaaurich@umiami.edu
<http://www.ichmt.org/NATO-ASI04>

International Summer School Thermodynamic Optimization and Constructal Design

Yildiz University, Istanbul, Turkey, July 19-21, 2004
Prof. Hasan Heperkan
Yildiz Technical University
Turkey
Email: heperkan@yildiz.edu.tr

5th International ASME/JSME/KSME Bi-Annual Symposium on Computational Technology (CFD) for Fluid/Thermal/Chemical/Stressed Systems with Industrial Applications

San Diego (La Jolla), California, USA, July 25-29, 2004

for Americas:

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<http://www.cfdcanada.com/pvp04.html>

The 4th International Symposium on Measurement Techniques for Multiphase Flows (ISMTMF)

Hangzhou, China, September 10-12, 2004

Prof. Hongjian Zhang

Prof. Zhiyao Huang

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The ILASS (Institute for Liquid Atomisation and Spray Systems) Europe meeting

Nottingham, UK, September 2004

Prof. Barry Azzopardi

School of Chemical, Environmental and Mining Engineering

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University Park

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3rd International Symposium on Two-Phase Flow Modelling and Experimentation

Pisa, Italy, September 22- 24, 2004

Dr. Gian Piero Celata

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Via Anguillarese, 301, I-00060 S.M. Galeria, Rome, Italy

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<http://www.ing.unipi.it/pisa04/>

6th International Topical Meeting on Nuclear Reactor Thermal Hydraulics, Operations and Safety (NUTHOS-6)

Nara-Ken New Public Hall, Nara, JAPAN, October 4-8, 2004

Dr. Mamoru Akiyama

Inst. Applied Energy

E-mail: info@nuthos6.org

<http://www.nuthos6.org/>

AICHE 2004 Annual Meeting

Austin, TX, USA, November 7-12, 2004

<http://www.aische.org/conferences/>

SPRAY-05 International Symposium on Heat and Mass Transfer in Spray Systems

Antalya, Turkey, June 5-10, 2005

Professor Faruk Arinc

ICHMT Secretary-General

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The 13th International Heat Transfer Conference
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ICMF-2004

International Conference on Multiphase Flow

May 31 - June 3, 2004
Yokohama Pacifico Conference Center, JAPAN



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Venue

The Conference will be held in the PACIFIC CONVENTION PLAZA YOKOHAMA Conference Center, Japan. Yokohama is an international port city located in the Metropolitan Area of Japan, which was opened to the foreign countries in 1859. Since then, this city has been keeping an international, exotic and entrepreneurial atmosphere. PACIFICO YOKOHAMA is a part of the newly developed water front area in Yokohama, known as "Minato Mirai 21" or "Future Port 21."

Time Table of ICMF-2004, Yokohama

May 30, Sunday

16:00-18:30 Registration

May 31, Monday

08:40- Registration
 10:10-10:50 Opening Ceremony (Room A)
 10:50-11:40 Plenary Lecture 1 (Room A)
 11:40-12:30 Plenary Lecture 2 (Room A)
 13:50-14:30 Keynote Lectures 1, 2 (Rooms A, B)
 14:40-16:00 Oral Session 1
 Room A OS7 Cavitation
 Room B Scope A Droplet & Breakup
 Room C OS7 Wave
 Room D OS6 Optical Instrumentation
 Room E Scope D Gas-Solid Channel Flow
 Room F Scope B Bubble Column & Bed
 Room G Scope B Fluidized Bed
 Room H OS7 Bubble Tracking & Hybrid Methods
 Room I Scope E Gas-Liquid Systems
 Room J OS5 Microbubble Drag Reduction
 16:00-16:30 Coffee Break
 16:30-18:30 Oral Session 2
 Room A Scope C Pool & Subcooled Boiling
 Room C Scope A Interface
 Room D OS6 PV
 Room E Scope D Bubbly Flow
 Room F OS7 Liquid Breakup & Drop
 Room G Scope B Particle-Turbulence Interaction
 Room H Others Heat & Mass Transfer
 Room I Scope E Heat Exchanger
 Room J OS5 Microbubble Flow
 19:00-20:30 Welcome Reception (Room B)

June 1, Tuesday

08:40-09:30 Plenary Lecture 3 (Room A)
 09:40-10:20 Keynote Lectures 3, 4 (Rooms A, B)
 10:20-10:50 Coffee Break
 10:50-12:30 Oral Session 3
 Room A Scope B Atomization
 Room B Scope A Single Bubble & Drop
 Room C Scope A Wave
 Room D OS6 Tomography
 Room E Scope D Interface Tracking Method
 Room F Scope B Bubbly Flow
 Room G Scope B Film & Annular Flows
 Room H OS2 Microgravity
 Room I Scope E Inclined Flow & Flowmeter
 Room J OS5 Microbubble Generator & System
 13:50-14:30 Keynote Lectures 5, 6 (Rooms A, B)
 14:40-16:00 Oral Session 4
 Room A OS7 Drop & Heat Transfer
 Room B Scope A Forces acting on Fluid Particle
 Room C Scope D Gas-Liquid Flow
 Room D Scope C Dilute Particle Flow
 Room E Scope D Dispersed Flow Simulation
 Room F Scope B Bubble & Slug Flows
 Room G Scope E Fluidized Bed
 Room H Others Motion of Solid & Fluid Particles
 Room I Scope E Atomization & Spray
 Room J Scope F PDFSimulation of Dispersed Flow
 16:00-16:30 Coffee Break
 16:30-17:10 Keynote Lectures 7, 8 (Rooms A, B)
 17:20-18:40 Oral Session 5
 Room A OS7 Particle Flow
 Room B Scope A Drop
 Room C OS7 New Models & Methods
 Room D Scope C Droplet & Jet
 Room E Scope B Gas-Liquid Channel Flow
 Room F Scope B Three-phase & Non Newtonian
 Room G Scope B G-L Flow in Complex Geometry
 Room H Others Drop & Bubble Motion
 Room I Scope D Velocity Field around Bubble
 Room J Scope F PDFSimulation of Dispersed Flow
 12:00-16:30 Poster Session 1 (Lounge)

June 2, Wednesday

08:40-09:30 Plenary Lecture 4 (Room A)
 09:40-10:20 Keynote Lectures 9, 10 (Rooms A, B)
 10:20-10:50 Coffee Break
 10:50-12:30 Oral Session 6
 Room A OS7 Interface Tracking Simulation
 Room B Scope A Bubble-Bubble Interaction
 Room C Scope A Wave & Instability
 Room D Scope C Condensation
 Room E Scope D Phase Change & Cavitation
 Room F Scope B Flow Regime & Transition
 Room G Scope D Liquid-Liquid Flow
 Room H Scope B Micro/Mini Channels
 Room I OS4 Separation & Control
 Room J Scope C Pool & Nucleate Boiling
 13:50-14:30 Keynote Lectures 11, 12 (Rooms A, B)
 14:40-16:00 Oral Session 7
 Room A OS7 Drag, Lift & Virtual Mass Forces
 Room B Scope A Gas-Liquid Flow
 Room C OS7 Particle-Turbulence Interaction
 Room D Scope C Flow Boiling
 Room E Scope D Particle Size Measurement
 Room F OS7 Modeling & Simulation
 Room G OS3 Bubble Plume & Granular Flow
 Room H Scope D Fluid-Solid Flow
 Room I OS4 Micro/Mini Channels
 Room J Scope E Rod Bundle
 16:00-16:30 Coffee Break
 16:30-17:10 Keynote Lectures 13, 14 (Rooms A, B)
 17:20-18:40 Oral Session 8
 Room A OS7 Bubble-Turbulence/Wake Interaction
 Room B Scope A Liquid Jet
 Room C OS7 Particle-Turbulence Interaction
 Room D OS1 Droplet
 Room E Scope D Particle Flow Simulation
 Room F Scope B Bubbly Flow
 Room G OS3 Cloud Droplet Flow
 Room H Others Particle & Droplet
 Room I OS4 Micro, Nano Particle & Bubble I
 Room J Scope E Nuclear Engineering
 12:00-16:30 Poster Session 2 (Lounge)
 19:00-21:30 Banquet

June 3, Thursday

08:40-09:30 Plenary Lecture 5 (Room A)
 09:40-10:40 Oral Session 9
 Room A OS7 Heat Transfer
 Room B Scope A Single Particle
 Room C Scope A Gas-Liquid Flow
 Room D Scope A Particle Flow
 Room E Scope D Gas-Liquid Interface
 Room F Scope B Advanced Model & Simulation
 Room G OS7 Averaged Method for Particle Flow
 Room H Scope D Two-Phase Flow in Chemical Process
 Room I OS4 Micro, Nano Particle & Bubble II
 Room J Scope E Two-Phase Flow in Vessel
 10:40-11:10 Coffee Break
 11:10-12:30 Oral Session 10
 Room A Scope A Gas-Liquid Flow
 Room B Scope A Particle-Particle Interaction
 Room C Scope E Spray & Jet
 Room D Scope C Heat & Mass Transfer
 Room F Scope B Slug Flow
 Room G OS7 Gas-Solid Flow
 Room H Others Multiphase CFD
 Room I OS4 MEMS
 Room J Scope E Particle Flow
 13:50-14:50 Award Lectures (Room A)
 14:50-15:50 Special Session (Room A)
 15:50-16:00 Closing Ceremony (Room A)

June 4, Friday

Technical Tour (Tentative)

Scope A Constituent Elements of Multiphase Flows
 Scope B Adiabatic Multiphase Flows
 Scope C Diabatic Multiphase Flows
 Scope D Advanced Models and Instrumentations
 Scope E Applications
 OS1 Application of PDF/Kinetic Approaches to Dispersed Flows

OS2 Microgravity Boiling and Two-Phase Flows
 OS3 Two-Phase Flow Applications in Environmental Systems
 OS4 Microscale Phenomena in Multiphase Flows
 OS5 Micro-Bubble and Its Application
 OS6 Imaging & Tomographic Techniques
 OS7 Computational Simulation of Multidimensional Multiphase Flows

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