



The International Information Center for Multiphase Flow

# NEWSLETTER

No.11

October 1998

The Japan Society of Multiphase Flow

## Governing Board of the International Conference of Multiphase Flow

by C. T. Crowe

The first Governing Board of the International Conference of Multiphase Flow was elected at ICMF'98 in Lyon. The function of the Governing Board is to execute the tasks necessary for the continuance of the ICMF and to select the host organization and dates of future conferences. The Board is responsible for the election of new members and is to serve in an advisory role for fund raising, new topics and awards.

There are four representatives from each of three geographical regions: America (north and south); Asia and Australia; and Europe, Africa and the Near East. The conference will rotate between these regions every three years. The elected representatives are:

### Americas;

C.T. Crowe; Washington State University (3 years)  
E. Michaelides; Tulane University (6 years)  
M. Roco; National Science Foundation (6 years)  
T.J. Hanratty; University of Illinois (3 years)

### Asia and Australia;

Y. Tsuji; Osaka University (3 years)  
Y. Matsumoto; The University of Tokyo (6 years)  
M.K. Kim; Pohang University of Science and Technology (6 years).  
M. Maeda; Keio University (3 years)

### Europe, Africa, Russia and the Near East;

L. van Wijngaarden; University of Twente (3 years)  
M. Sommerfeld; Martin Luther University Halle-Wittenberg (6 years)  
R.I. Nigmatulin; Russian Academy of Sciences (3 years)  
J. Bataille; Ecole Central of Lyon (6 years)

C.T. Crowe was selected to chair the Board and Y. Matsumoto serves as vice Chair. During the next ICMF, two candidates from each geographical area will be elected for 6 year terms. ICMF-2001 will be May 27 - June 1, 2001, at Tulane University in New Orleans. Professor E. Michaelides will be the conference chairman.

N. B. The name of Conference held in Tsukuba, Japan, in September, 1991 was The International Conference on Multiphase Flows (ICMF'91-Tsukuba) (Chairman; Prof. G. Matsui). However, since it was agreed to hold the Conference in future, the name has been modified to The International Conference on Multiphase Flow (ICMF). The 2nd Conference (ICMF'95-Kyoto) was held in Kyoto, in April, 1995 (Chairman; Prof. A. Serizawa).

### To Join ICeM:

Everybody, who has an interest in "multiphase flow", can become a member of ICeM. ICeM welcomes his/her joining. Please contact either of the following to register in ICeM.

#### Chairman(Editor):

Professor Goichi Matsui  
Inst. of Engineering Mechanics  
University of Tsukuba  
Tsukuba 305-8573, Japan  
Tel: +81-298-53-5129  
Fax: +81-298-53-5207  
E-mail: matsui@kz.tsukuba.ac.jp

#### Vice Chairman:

Professor Yutaka Tsuji  
Faculty of Engineering  
Osaka University  
Suita, Osaka 565-0871, Japan  
Tel & Fax: +81-6-879-7315  
E-mail: tsuji@mech.eng.osaka-u.ac.jp

**Americas**



C.T. Crowe



E. Michaelides



M. Roco



T.J. Hanratty

**Asia and Australia**



Y. Tsuji



Y. Matsumoto



M.K. Kim



M. Maeda

**Europe, Africa, Russia and the Near East**



L. van Wijngaarden



M. Sommerfeld



J. Bataille

R.I. Nigmatulin

## Report on The Third International Conference on Multiphase Flow ICMF'98

by J. Bataille and R.J. Perkins

The Third International Conference on Multiphase Flow (ICMF'98) was held in Lyon from June 8th to 12th, 1998. It was the third in a series of International Conferences on Multiphase Flow, the first of which was organised in Tsukuba, Japan, in 1991, and the second in Kyoto, Japan, in 1995. The conference attracted over 600 participants, with about 20% coming from industrial organisations. In all, over 30 countries were represented, with the largest delegations coming from France (180 participants), the remainder of Western Europe (175 participants), Japan (110 participants), North America (85) and Russia (30 participants).

Out of 620 abstracts initially received, 480 were selected for inclusion at the conference, either as oral presentations (380) or as posters (100). The scientific content of the conference was divided into five main topics:

S1: Dynamics of isolated bubbles, drops and particles  
S2: Physics of dispersed flows  
S3: Flow structure and instabilities  
S4: Heat transfer and phase change  
S5: Applications of multiphase flows

The oral presentations were organised in 8 parallel sessions; posters were displayed throughout the week. There were 4 plenary lectures:

The rheology of concentrated suspensions, variations on a theme by Albert Einstein

A. Acrivos

Group combustion in spray flames

S. Candel

The roles of interfacial stability and particle dynamics in multiphase flows

T.J. Hanratty

Struggle with computational bubble dynamics

A. Tomiyama

and 16 keynote lectures:

Bubble wakes -- vorticity generation and its influence on the motion and stability of bubbles

J. Magnaudet

Two and three dimensional measurements of the interaction between bubbles and particles with the surrounding flow

J. Katz

The interaction of deformable drops in shear flow

E.J. Hinch

Singularities associated with modelling of interactions of drops and bubbles with solid boundaries

Y.D. Shikhmurzaev

The impact of drops on walls and films

C. Tropea

Turbulence structure of dispersed two-phase flows (Measurements by laser techniques and modelling)

K. Hishida

Simulation of particulate flows of Newtonian and viscoelastic fluids

H.H. Hu

Distortion of small scale turbulence by dispersed particles

J.K. Eaton

Cloud cavitation: observations, calculations and shock waves

C.E. Brennen

Interaction of shock waves and non-homogeneous gases and two-phase gas-particles media

J.-F. Haas

Core-Annular flows

D.D. Joseph

Non-linear theory of film boiling

S. Davis

Research on the improvement of fin-tube heat exchangers for alternative refrigerants

M.H. Kim

Solidification and flow in mushy layers

M.G. Worster

Boiling simulator: a simple theoretical model of boiling

M. Shoji

Steady and unsteady condensate formation in turbomachinery -- blade to blade flow and rotor/stator interaction

G.H. Schnerr

Friday morning was devoted to three parallel sessions of invited contributions and general discussions, on the following topics:

Research priorities and programmes in multiphase flow

Industrial applications of multiphase flow

Sonoluminescence

For the first time, two awards were presented; the Multiphase Flow International Prize was awarded to Prof. T. Hanratty, University of Urbana-Champaign, USA, and the Young Scientist Multiphase Flow Breakthrough Award went to Prof. H. Hu, University of Pennsylvania, USA.

The following companies participated in the technical exhibition which was organised in parallel with the conference:

AEA Technology

Aerocinesis

Begell House Inc.

Dantec

Digital

DRS Hadland Ltd.

Elsevier Science

Fluent France

Lot-Oriel

Oxford Lasers

Photonetics

RBI

Silicon Graphics

Spectra-Physics

ICMF'98 was organised under the auspices of the

following organisations, institutions and professional societies:

Ministere de l'Education Nationale, de la Recherche et de la Technologie  
Centre National de la Recherche Scientifique  
Ecole Centrale de Lyon  
Universite Claude Bernard - Lyon I  
Association Universitaire de Mecanique  
Centre National d'Etudes Spatiales  
Haut Commissariat a l'Energie Atomique  
United States National Science Foundation  
American Society of Mechanical Engineers  
Japan Society of Mechanical Engineers  
Japan Society of Multiphase Flow  
VDI-GVC Gesellschaft fur Verfahrenstechnik und Chemingenieurwesen  
Institute for Multifluid Science and Technology

The conference received financial support from the following organisations:

La Ville de Lyon  
Le Grand Lyon  
Conseil General du Rhone  
Conseil Regional Rhone-Alpes  
Bureau des Congres de Lyon  
Digital Europe  
Palais des Congres de Lyon

Total  
Electricite de France  
Auris  
Alma  
British Petroleum, UK  
Digital France  
Eastman Kodak (US)  
IEA Japan  
Infotech  
Institut Franc cais du Petrole  
Schlumberger UK  
Silicon Graphics  
Transfer  
Unilever (UK)

The proceedings of the conference are available on CD-ROM, and can be purchased; for further details, please contact:

Prof. R.J. Perkins  
Laboratoire de Mecanique des Fluides et d'Acoustique  
Ecole Centrale de Lyon 36 avenue Guy de Collongue  
69131 Ecully France  
Tel: +33 (0)4 72 18 61 53  
Fax: +33 (0)4 78 64 71 45  
Email: perkins@mecaflu.ec-lyon.fr

---

### **Report on "9th International Freight Pipeline Society Meeting" April 20-23, 1998, Monterrey, Mexico**

by George E. Klinzing

In April of this year the IFPS met in Monterrey, Mexico having 40 presentations in the area of pneumatic, hydraulic and capsule pipeline coming from number countries from around the world. The conference included a short course in pneumatic conveying offered by Mr. Paul Solt. In addition a pre-conference workshop on pneumatic conveying was held with wide participation from the membership. Two Society awards were presented with Gramme Addie and Fred Zenz for the contributions to the fields of hydraulic and pneumatic transport. The award winners presented special lectures highlighting their work and the state of the field. The local arrangement were handled by Marco and Camille Flores. Marco Flores ar-

ranged for a tour to the HYLSA industrial site after the conference. This tour demonstrated many solids processing operations. At the meeting Dr. Thomas Marrero of the University of Missouri, Columbia took over as the new president of IFPS with the Vice President being Dr. Tomita of Kyushu Institute of Technology. The next meeting is planned in two years time.

Prof. George E. Klinzing  
Past President IFPS 801 CI  
University of Pittsburgh  
Pittsburgh, PA 15260 USA  
Tel: 412-624-0784  
FAX : 412-383-9640  
E-mail: Klinzing@engrng.pitt.edu

**Report on the "3rd International Symposium on Cavitation"  
April 7-10, 1998 - Grenoble, France.**

by Jean-Marie Michel

The 3rd International Symposium on Cavitation followed the two first ones (Sendai 1986, Tokyo 1994) which were organized by Professor Murai, from the Tohoku University, and Professor Kato, from the University of Tokyo. As they were very successful, Professor Kato suggested that such Symposia should become periodic (with a period of three or four years) and itinerant, in order to underline their international character. That proposal was well received by the scientific community interested in the problem of cavitation, and the Grenoble Research Group was asked to take in charge the organization of the future 1998 third Symposium. Later it was decided that the Scientific Committee of that Symposium would be co-chaired by Professor Kato and Dr Michel, Research Director at C.N.R.S. Meanwhile Dr Franc, Research Assistant at C.N.R.S., accepted to be the Chairman of the local Organizing Committee.

The Scientific Committee was made up of twenty members from various countries. They accepted 105 papers among the 130 ones which were submitted. The authors came from Japan (26 papers), France (22), Ukraina (10), US (9), Russia (7), Germany (6), P. R. of China (4), Netherlands, Sweden and Switzerland (3), Italy, Norway, Rumania and United Kingdom (2), South Korea, Denmark, Spain and Poland (1). Three invited general lectures were given by Professor Matsumoto (Tokyo), Professor Lesieur (Grenoble) and Professor Kinnas (Austin, Texas). All papers were gathered in two volumes of Proceedings which were available at the beginning of the Symposium. A third volume was edited after the Symposium : it contains the discussions (questions, comments and replies) which followed the oral presentation of papers. About twenty papers were given in a poster session. The number of attendants to the Conference was 187.

The papers turned around the following topics : bubble dynamics (11 papers), nuclei and inception (14), hydrofoils and partial cavities (10), propellers (9), fluid machinery (9), supercavities (11), instrumentation and procedures (5), cavitation erosion (20), modelling (12), miscellaneous (4). It appears that at the present time some main topics draw the attention of scientists in an in-

creasing way. That is the case for cavitation erosion which remains a difficult problem on the fundamental ground, although several strategies are now available to predict its effects. That is the case also for the problem of partial attached cavities, with their trail of undesirable consequences (unstabilities, noise and erosion potential) : their possible periodical behaviour seems to be better understood, and conditions for its existence, besides of other kinds of cavity behaviours, become progressively apparent. Finally, a significant effort is devoted in many countries to the numerical description of unsteady flows with attached cavities : here the hope of applications to propellers and turbomachinery problems - efficiency, vibrations, shaft and bearing control - is evident.

As for fundamental fluid mechanics, bubble dynamics is still now the source of deep research works requiring high tech experimental set-ups and leading to new insights in the complexity of interfaces mechanics, possibly at the nanometer scale. Another field of living research is found in supercavities which now are flirting with transsonic and supersonic speeds. That last, unexpected - although logical - development of cavitation research seems to be made public for the first time at the occasion of this Symposium.

At the opening of the meeting, Professor Kato stated that, after the present century in which physics of cavitation was deeply studied and described, possibly the 21th century will see the development of techniques using cavitation : that is already the case in different fields such as medicine, material cleaning, flow discharge limiters and prospecting of undersea oil resources. Indeed future may be rich in new developments, since cavitation presents many singular features among mechanical phenomena.

During the Conference it was decided that the 4th International Symposium on Cavitation will be held in Pasadena (California) in June 2001 under the responsibility of Professor Brennen, from the California Institute of Technology.

Dr. MICHEL Jean-Marie  
LEGI/IMG, BP 53 - 38041 Grenoble Cedex 9  
Tel: (33) (0)4 76 82 50 47  
Fax: (33) (0)4 76 82 52 71  
E-mail: Jean-Marie.Michel@hmg.inpg.fr

**Report on "9th International Fluidization Conference,  
May 17-22, 1998, Durango, USA**

by L. S. Fan

The 9th Engineering Foundation Conference (Fluidization IX) was held in Durango, Colorado, from May 17 through May 22, 1998. The conference was organized by Dr. Ted Knowlton of Particulate Solid Research, Inc. and myself. A total of 166 persons participated in this conference, which included almost all the experts in the world in the field of fluidization. There were a total of 95 papers presented in the formal program: 91 regular papers, 4 keynote lectures. These papers were selected from a total of 173 abstracts submitted for consideration by the conference. A peer-reviewed conference proceedings was distributed to all participants at the conference. The conference proceedings (Fluidization-IX, edited by Liang-Shih Fan and Ted M. Knowlton, ISBN 0-939204-56-8) can be purchased by contacting Barbara Hickernell, Engineering Foundation, 345 East 47th Street, Suite 303, New York, New York 10017-2375 or e-mail ENG FND@AOL.COM.

Furthermore, there were 11 video presentations made, as well as 34 free forum papers. The free forum papers were not included in the official conference proceedings. One of the high points of this conference was the workshops in which the state-of-the-art knowledge, as well as the future direction in research and education were discussed. There were 10 workshops that addressed various topics including scale-up, techniques for fluidizing and transferring cohesive and sticky particles, chaos and process diagnostics, tracers, probes, non-intrusive measurement techniques, advances in liquid and multiphase fluidization, computational fluid dynamics, future directions in research and education, relative advantages and disadvantages of risers and downers, high pressure/high temperature fluidization, and advances in FCC and catalytic processes. Intensive interactions between conference participants took place during conference workshops. A summary of the workshops was prepared and distributed to all conference participants.

Several highlights of the technical paper presentations, as well as discussion, is summarized below:

1. The effective stress representing interaction forces and momentum transport in the particle assembly can in principle, be obtained from two simple experiments of the bed height and pressure drops during the process of fluidization and defluidization.

2. The computation fluid dynamics in either continuum or discrete simulation offer important

information about the fluidization dynamics, however, the computation fluid dynamics codes are only as good as the closure model for fluid phase stress, particle phase stress, and fluid particle interaction forces.

3. Fundamental principles can be evaluated from simple experiments regarding the minimum fluidization velocity, minimum bubbling velocity, and jet penetration depth. The pressure and temperature effects on fluidization can also be evaluated based on the quantitative results of these properties.

4. An important fluidized bed technology application in energy conversion, environmental systems is using coal in high efficiency power generating processes; one attractive new type of fluidization combined cycle is the topping cycle power generation process. In this process a coal gasifier and a combustor are combined in a series using fluidized beds.

Indications were made of various research areas in which future research needs to be emphasized. These include interparticle forces on cohesive particles, surface properties, shape effect of the particle in computational fluid dynamics, more advanced or newer correlation equations for design purposes; chaos analysis, new fluidization involving intelligent particles and sonic velocity fluidization, liquid fluidization and high pressure gas-liquid-solid fluidization.

Education issues in fluidization and fluid particle systems were also discussed. It was concluded that chemical and mechanical engineers are graduating without much knowledge of particulate and particle technology, despite their importance in many processes. One opinion was that university education should concentrate on fundamentals and leave more practical subject topics to be learned in industry. Undergraduate and graduate lectures and laboratory courses need to expose students to fluidization and fluid particle systems. Furthermore, conference participants noted approximately 2,000 papers/reports per year and about 200 patents per year are related to fluidization. It is extremely difficult to keep up with the torrent of information. Researchers should be encouraged to periodically write book reviews to summarize this information so that it can be disseminated effectively.

Dr. L. S. Fan

Department of Chemical Engineering  
The Ohio State University  
Columbus, OH 43210-1180  
E-mail: fan.1@osu.edu

**Report on CSME FORUM 1998**  
**The Biennial Conference of the Canadian Society for Mechanical Engineering**  
**Toronto, Ontario, Canada, May 19-22, 1998**

by Marc A. Rosen

CSME Forum 1998, the fifth biennial conference of the Canadian Society for Mechanical Engineering, was held at Ryerson Polytechnic University, Toronto, Ontario, Canada, on May 19-22, 1998. The Department of Mechanical Engineering at Ryerson Polytechnic University organized this major international event, and was particularly proud to have done so in 1998, since this year coincides with both Ryerson's 50th anniversary and the 50th anniversary of mechanical programs at Ryerson. The Chair of CSME Forum 1998 was Marc A. Rosen, Professor and Chair of Ryerson's Department of Mechanical Engineering.

The Forum promotes the communication and transfer of technology between industry, government agencies, universities and R&D laboratories, through the presentation and discussion of challenges and recent research activities in mechanical engineering and related fields. The Forum brings together researchers from Canada and abroad, and encourages a focus on problems and issues of practical importance.

Special technical themes are included within the Forum as symposia, and this year eleven symposia were held, covering such core areas as manufacturing, automation, robotics, mechanics, machines and mechanisms, thermodynamics, heat transfer, fluids mechanics, energy, and transportation. Also covered were such broader topics as the engineering profession; engineering design, optimization, education and management; and aerospace, environmental, industrial and materials engineering.

In all, the Forum was attended by about 450 delegates, and 379 presentations were delivered. Almost half of the presentations were by international authors. Twelve topical keynote presentations were delivered within the symposia by respected and recognized researchers, and a special keynote address by Dr. Thomas A. Brzustowski, President of the Natural Sciences and Engineering Council of Canada opened the Forum. Six panel discussions, and the CSME History Seminar, were also held within the Forum.

Early arrivals were treated to a welcoming reception. The CSME Honours and Awards Banquet was held at the Delta Chelsea Inn and was attended by over 200 delegates. The banquet guest speaker was Jim Middleton of Spar Space Systems Brampton. In addition, over 50 delegates opted to enjoy a dinner and social evening high above Toronto at the CN Tower, the world's tallest free-standing structure.

CSME Forum 1998 had several other important components. An exposition occurred, featuring almost 20 exhibitors from industry and publishing. A meeting of the chairs and heads of mechanical engineering and related departments across Canada was held, in which issues and challenges of common interest were discussed. In the CSME Student Design Competition, six teams from across Canada competed by presenting their innovative and interesting engineering design projects to a panel of distinguished judges.

The proceedings of CSME Forum 1998 were published in five volumes, totaling almost 3000 pages. The symposia held within CSME Forum 1998, which are represented in the proceedings, are as follows:

1. Thermal and Fluids Engineering. Chairs: I. Dincer, King Fahd University of Petroleum & Minerals, Saudi Arabia and X. Li, University of Waterloo, Canada (Volume I)
  2. The Mechanics of Solids and Structures. Chair: A.L. Kalamkarov, DalTech/Dalhousie University, Canada (Volume II)
  3. Materials Technology. Chair: J.S. Sheasby, University of Western Ontario, Canada (Volume II)
  4. Design Integration and Optimization. Chair: A. Banwatt, Atomic Energy of Canada Ltd., Canada (Volume III)
  5. Industrial Engineering and Management. Chairs: J.A. Buzacott, York University, Canada and L. Fang and Y.J. Wu, Ryerson Polytechnic University, Canada (Volume III)
  6. Safety in Engineering and Safety by Design. Chairs: D.J. Pedley, Donald J. Pedley & Associates, Canada, and D.A.G. Meston, H&S Consultants Inc., Canada (Volume III)
  7. Manufacturing, Automation and Robotics. Chairs: M.F. Stewart, Ryerson Polytechnic University, Canada and A.D. Spence, McMaster University, Canada (Volume IV)
  8. Theory of Machines and Mechanisms. Chair: L. Cloutier, LavaUniversity, Canada (Volume IV)
  9. Future Directions in Engineering Education and the Profession. Chair: I.G. Currie, University of Toronto, Canada (Volume V)
  10. Recent Advances in Transportation Systems and Technologies. Chairs: S. Rakheja, Concordia University, Canada and J.Y. Wong, Carleton University, Canada (Volume V)
- (An eleventh symposium, World Energy Systems, was held at CSME Forum 1998 and run in

conjunction with the Second International World Energy System Conference, which is publishing those papers separately.)  
Prof. Marc A. Rosen  
Department of Mechanical Engineering

Ryerson Polytechnic University  
Toronto, Ontario, CANADA  
Tel: (416) 979-5303,  
Fax: (416) 979-5265  
E-mail: mrosen@acs.ryerson.ca

---

**Report on the 1st European-Japanese Two-Phase Flow Group Meeting  
June 1-5, 1998, Portoroz, SLOVENIA**

by Iztok Zun and Goichi Matsui

The European Two-Phase Flow Group was established in 1963 at the

Royal Institute of Technology in Stockholm after the EAES Symposium on Two-Phase Flow, Steady State Burnout and Hydrodynamics Instability. It was founded by Professor Becker, who held a chair of Reactor Technology at the Royal Institute of Technology at the time. Each year, the national delegate of the host country takes the chair. There is a limited number of seats for each member country: Belgium, Denmark, European JRC, France, Finland, Germany, Greece, Italy, Israel, Norway, the Netherlands, Portugal, Slovenia, Spain, Sweden, Switzerland and United Kingdom. The main objectives of the meetings were always state of the art reports, synergism of academic and industrial circles and a special care for the younger generations.

The proposal to organize the first European-Japanese Two-Phase Flow Group Meeting was made by Japanese participants at the Japan-US Two-Phase Flow Seminar on Two-Phase Flow Dynamics in Fukuoka in 1996. It was decided at the 35th European Two-Phase Flow Group Meeting in Brussels that the first European-Japanese Two-Phase Flow Group Meeting would be held in Portoroz, Slovenia on June 1-5, 1998, together with the 36th European Two-Phase Flow Group Meeting.

The following countries participated at the Portoroz Meeting: Belgium, France, Germany, Italy, Japan, the Netherlands, Slovenia, Sweden and UK. The total number of expert contributions was 41, 15 from Japan. The following sessions were held: Boiling and Heat Transfer, Pressure Release Systems, Dispersed Flow, Nuclear Reactor and Experimental Techniques. Two main topics stem from the various subjects which were practically unlimited. European participants put strong emphasis on boiling while Japanese participants chose bubbly flow. Since these two sub-

jects are strongly interrelated, the discussion was very fruitful. The list of papers presented can be found at the Web site at

<http://www.werg.casaccia.enea.it/eurotherm/etpfgm.html>

On the last day of the meeting, an Open Forum was held on prospects for European-Japanese Collaboration. An agreement has been reached on proposing further contacts which would also comprise existing bilateral seminars, such as German-Japanese or Japanese-UK. Prof. Hewitt has taken the initiative to further the proposal. An agreement has also been reached to establish a Center for Multiphase Flow Studies with its seat in Portoroz. The members of the steering committee of this center are: Prof. Serizawa, Prof. Tomiyama and Prof. Matsui from Japan, Prof. Zun (Slovenia), Dr. Celata (Italy), Prof. Auracher (Germany), Prof. Fabre (France) and Prof. Hewitt (UK). The basic purpose of this center is to expose younger generations to different schools of thought.

The organizers are fully indebted to the following sponsors (listed in alphabetical order): AVL-LIST GmbH, Austria, Central Research Institute of Electric Power Industry (CRIEPI), IEA of Japan, Japan Society for the Promotion of Science (JSPS), Japan Society of Multiphase Flow (JSMF), Japan Atomic Energy Research Institute (JAERI), Nuclear Power Engineering Corporation (NUPEC), Japan, Ministry of Science and Technology, Slovenia, and Sumitomo Chemical, Japan

Prof. Iztok Zun  
Faculty of Mechanical Engineering  
University of Ljubljana  
1000 Ljubljana, Slovenia  
Tel.: +386 61 17 71 403  
Fax.: +386 61 12 54 217  
E-mail: iztok.zun@fs.uni-lj.si



**Report on International Symposium on Heat and Mass Transfer  
in Biological and Medical Engineering  
Kusadasi, TURKEY, June 8-12, 1998**

by Kenneth R. Diller

**The foreword for the Biotransport 98 proceedings**

This volume is comprised of the papers presented at the Biotransport'98 Symposium held in Kusadasi, Turkey during 8-12 June, 1998. The Symposium was organized by the Editor under the auspices of the International Centre for Heat and Mass Transfer in coordination with the ICHMT Secretariat, Professor Faruk Arinc. In addition to the full papers presented herein, the Symposium included a number of shorter presentations that were summarized in a book of abstracts published by the ICHMT and available on site.

Although the study of heat and mass transfer processes has been a primary area of focus in the engineering sciences for well over a century, applications in living systems have begun to receive significant attention over only the past two decades. The study of Pennes on the effect of blood perfusion on the local temperature distribution in tissue, published fifty years ago,<sup>1</sup> was the first quantitative analysis of bioheat transfer that had far-reaching impact on our understanding of the field. At the same time Moritz and Henriques published a series of papers that quantified for the first time the relationship between temperature and time of exposure on the genesis of thermal injury to tissues.<sup>2</sup> Both of these works have stimulated the studies of many subsequent researchers and remain in high regard to the present day. One of the first volumes dedicated to the subject of biotransport was published by the ASME in 1968.<sup>3</sup> As important clinical and industrial applications continue to be developed, the rate of new workers entering the field is growing rapidly.

The Biotransport'98 Symposium is the second on this topic sponsored by the ICHMT, following a first meeting held in Athens in September, 1991.<sup>4</sup> Biotransport'98 featured session topics in the areas of (1) Therapeutic Processes; (2) Blood Perfusion Effects on Heat Transfer; (3) Environmental Thermal Interactions; (4) Mass Transfer in Living Systems; and (5) Cryobiology. The chapters in this volume follow the same topical outline. The authors include many of the established leading workers in the world, as well as researchers still early in their careers.

All papers published in this volume were subjected to a rigorous peer review process under

the guidance of a distinguished Board of Editors. Multiple reviews were conducted, with extensive revisions required in many instances. I would like to thank the following Editorial Board members for their excellent contributions to the adjudication process to insure the scholarly quality of this volume: Dr. John Chato, University of Illinois; Dr. Hiroshi Ishiguro, University of Tsukuba; Dr. Thomas Ryan, Valleylab, Inc.; Dr. Avraham Shitzer, The Technion; Dr. Mehmet Toner, Harvard University.

We anticipate that the publication of this volume will provide insight and direction for the entire bioheat and mass transfer community as well as the participants in the Symposium.

Kenneth R. Diller  
Biomedical Engineering Program  
The University of Texas at Austin  
E-MAIL: kdiller@mail.utexas.edu

1. Pennes, H.H. 1948. Analysis of tissue and arterial blood temperatures in the resting human forearm. *J*

2. Henriques, F.C. and A.R. Moritz. 1947. Studies of thermal injury. I. The conduction of heat to and through skin and the temperatures attained therein. A theoretical and an experimental investigation. *Am. J. Pathol.* 23: 531-549.

3. Chato, J.C. ed. 1968. *Thermal Problems in Biotechnology*, ASME, New York.

4. Diller, K.R. and A. Shitzer, eds. 1992. *Macroscopic and Microscopic Heat and Mass Transfer in Biomedical Engineering*, ICHMT Press, Belgrade.

Summary comments for use by NYAS staff to promote this volume. Bioheat and mass transfer is one of the most rapidly growing areas of transport analysis. This volume presents the latest research results in biotransport studies at laboratories from around the world. A diverse scope of topics covers issues from basic science to clinical applications.

Topics for the volume.

- (1) Therapeutic Processes
- (2) Blood Perfusion Effects on Heat Transfer
- (3) Environmental Thermal Interactions
- (4) Mass Transfer in Living Systems
- (5) Cryobiology

**Report on ASME FED Summer Meeting  
June 22-25, 1998, Washington D.C.**

by C. T. Crowe

The primary symposium dealing with multiphase flows was "Numerical methods in Multiphase Flows". Professor C.T. Crowe served as chair of the organizing committee. There were six sessions in this symposium on bubbly flows, direct numerical simulation, particle dispersion, particle turbulence interaction, particle-fluid simulations and two-fluid models. Professor Tom Shih of Carnegie-Mellon University gave an invited paper entitled "Computation of Multiphase Flows". The session on bubbly flows included papers on flow around a cylinder, cavitation in a shear layer, cavitation inception and shock waves in cavitating flows. The session on direct numerical simulation included papers on applications of finite element analysis, two-way coupling effects and particle-turbulence interaction. The session on particle dispersion addressed Lagrangian methods for long-time dispersion, particle diffusion in wakes, the use of the Monte Carlo approach, dispersion in a boundary layer and saltation effects. The session on particle-turbulence interaction included papers on turbulence modulation, two-fluid ap

proach, coupling in bluff-body wakes and a paper discussing the models used for turbulence modulation. The papers on particle-fluid simulations considered spatial resolution in LES calculations, Brownian dynamics in vortical flows and direct numerical simulations in non-Newtonian fluids. The final session on two-fluid models included papers on two-fluid dispersion models, inertial particle transport, charged particle deposition and two-phase turbulent jets with large particles.

The next symposium will be part of summer ASME FED meeting in 2000. The organizer will be Professor G. Tryggvason of the University of Michigan (e-mail address gretar@umich.edu)

Prof. C.T.Crowe  
Washington State University  
Department of Mechanical  
and Materials Engineering  
Pullman, WA 99164-2920, U.S.A.  
TEL: +1-509-335-8654  
FAX: +1-509-335-4662  
E-MAIL: crowe@mme.wsu.edu

---

**Report on 27TH INTERNATIONAL SYMPOSIUM ON COMBUSTION  
Denver, Colorado, USA, August 2-8, 1998**

by Lixing Zhou

The 27th International Symposium on Combustion was held in August 2-8 at the University of Colorado at Denver, USA. There were 1104 participants in this meeting from North America, Europe, South America, Asia, Africa and other parts of the world. Totally 283 session papers (including 5 plenary lectures) and 109 contributed posters were presented. The plenary lectures are: J. Wolfrum: Lasers in combustion: from basic theory to real devices S.M. Correa: Power generation and aeropropulsion gas turbines--from combustion science to combustion technology P.D. Ronney: Understanding combustion processes through microgravity research Y. Takagi: A new era in spark ignition engines featuring high pressure direct injection P. Lindstedt: Modeling of the chemical complexities of flames

The session papers cover a wide range of different fields of combustion, including turbulent premixed combustion, turbulent non-premixed combustion, combustion fundamentals for solid

fuels, reaction kinetics, soot, PAH, air toxics, high-intensity combustion, fire research, gaseous combustion, IC engines and sprays, laminar flame dynamics, waste combustion and incineration, FBC and particle dynamics, material synthesis and catalytic combustion, detonations, propellants energetic materials, and stationary combustion systems.

The next, that is the 28th International Symposium on Combustion will be held in Glasgow, Scotland, in 2000.

Prof. Lixing Zhou  
Member of Board of Directors, the  
Chinese Section of the Combustion  
Institute  
Department of Engineering Mechanics  
Tsinghua University  
Beijing 100084, China  
Fax: (86-10)-6278-5569  
E-mail: zhoulx@mail.tsinghua.edu.cn

## Report on International Conference on Heat Exchangers for Sustainable Development Lisbon, Portugal, June 22-25, 1998

by Maria Graca Carvalho

The Conference has been conducted in Lisbon, Portugal in June 22-25, 1998. More than 100 attendees from 23 countries have participated at the Conference. Program of the Conference has comprise ten sessions with 9 invited lectures and 68 papers.

It has been recognized that heat exchangers are an indispensable part of energy conversion and thermal transport systems and can be expected to play a crucial role in the Sustainable Development of the earth's resources. With the approach of the 21st century, the need for heat exchangers in energy recovery, process heating/cooling, residential and commercial HVAC systems, and the exploitation of waste heat will grow dramatically. To successfully exploit this market opportunity, heat exchanger developers will need to more fully address thermal inefficiencies and thermodynamic irreversibility, along with material costs, manufacturing constraints and environmental concerns, throughout the design process.

This International Conference has brought together heat exchanger manufacturers, designers and users. The Conference has provided technology specialists and hardware developers with the opportunity to discuss, review, and demonstrate the research directions, design methodologies, and production techniques leading to cost-effective heat exchangers for sustainable development.

Since the main subject of the Conference was devoted to the sustainability development in thermal engineering and its application in the design, manufacture and marketing of heat exchangers, the main theme of the Conference was focused on the following topics: Sustainability criterions for heat exchanger design Heat exchanger design for manufacturing Heat exchangers in process industry Thermal characterization of heat exchangers Heat exchangers in HVAC Novel heat exchanger design Software and computational method for heat exchanger design

The Conference has recognized that scientific

and technological knowledge should be applied to articulate and support the goals sustainable development in thermal engineering. Each session was headed by the respective invited lecture, among those are:

Sustainability Criterions for Heat Exchanger Design, N. Afgan and M. G. Carvalho, Instituto Superior Tecnico, Portugal

Heat Exchanger Design and Production: a Manufacturer's View of Sustainable Development into the 21st. Century, T. De Vuono, Modine Manuf. Co., USA

Approximate Design and Costing Methods for Heat Exchangers, G. F. Hewitt, S.J.Pugh, ICSTM, U. Kingdom

Modern Problems in Analysis Design, Production and Exploitation of Compact Tubular Heat Exchangers G. A. Dreitser, Moscow Aviation Institute, Russia

Advances in Air-Cooled Heat Exchanger Technology R. Webb, The Pennsylvania State University, USA

Axial Dispersion in Shell-and-Tube Heat Exchangers W. Roetzel and F. Balzereit, University of Federal Armed Forces, Germany

Optimization of Finned Arrays A. Kraus, Allan D. Kraus Associates, USA

Liquid Metal Heat Exchangers S. Cho, Foster Wheeler Development Corp., USA

Heat Exchangers for Inherently Safe Reactors, M. Cumo, University of Rome "La Sapienza", Italy

The Fifth Framework Programme - A Break with the Past, P. Pilavachi, European Commission, Belgium

Maria Graca Carvalho  
Instituto Superior Tecnico  
Av. Rovisco Pais  
1096 Lisbon, Portugal  
Tel: +3511 8477873  
Fax: + 3511 8475545  
E-mail: mgraca@navier.ist.ut.pt

Please address information on multiphase flow researches and researchers to the Editor. Also, please invite colleagues working on multiphase flow in your country to join ICeM.

**Report on Thermodynamics, Heat and Mass  
Transfer of Refrigeration Machines and Heat Pumps  
-EUROTHERM Seminar 59  
Nancy, FRANCE July 6-7, 1998**

**FOREWORD**

The present seminar Eurotherm 59 on Thermodynamics, heat and mass transfer of refrigeration machines and heat pumps, will be hold in NANCY, the 6 - 7 of July 1998.

This seminar is an international event, that will be attend by about 100 engineers scientists and industrial partners not only from countries of the european community such as Denmark, France, Germany, Spain, The Netherlands, but also from Poland, Romania, Slovenia, Ukraine, Algeria, Cameroun, South Africa, Tunisia, Mexique, U.S.A., Israel and China.

In this proceedings volume three invited conferences and thirty seven regular papers are published. The main sessions deal with :

- thermodynamics and modeling of machines,
- heat and mass transfer (falling films ; boiling and condensation),
- experiments and alternatives of machines (experiments on machine ; alternatives to vapour compression machines),
- characterization and augmentation of heat transfer,
- dynamics of machines and systems.

A posters session with ten presentations follows to the preceding.

A round table discussion has been added at the end of the seminar to define the future research and development needs.

A following seminar is envisaged in the future to see the corresponding progresses ( a project is in course by Prof. J. REY from VALLADOLID, Spain).

Thanks are due to the contributors who have offered a wide variety of papers dealing with theory and practice. The conference could not have been so successful without the efforts of many peoples. Most of the hard work in the organization of the conference details fell to C. AUGSBÜRGER and C. FRADEIRA, who, through their efforts, contributed so much to the preparation of the meeting. We are also most gratefull to the reviewers ; they permit to detect at least sixteen papers that will be probably published in scientific journals soon. Further, the conference chairmen will be assist during the seminar by the session presidents for stimulation and direction of fruitful discussions.

The organizing committee  
H. AURACHER, M. FEIDT, G. TSATSARONIS  
editors of the seminar

Prof. M. Feidt  
Universite Henri Poincare, Nancy, France  
Fax: +33 3 83 59 55 51,  
E-mail: mfeidt@ensem.u-nancy.fr

**Report on 9th International Symposium on  
Application of Laser Techniques to Fluid Mechanics  
Lisbon, PORTUGAL, July 13-16, 1998**

by Manuel Heitor

The prime objective of this Ninth International Symposium on "Applications of Laser Techniques to Fluid Mechanics" was to provide a forum for the presentation of the most advanced research on laser techniques for flow measurements and results of significance to fluid mechanics. The applications of laser techniques to scientific and engineering fluid flow research was emphasized, but contributions to the theory and practice of laser methods were also considered where they facilitate new improved fluid mechanic research. Attention was placed on laser-Doppler anemometry, particle sizing and other methods for the measurement of velocity and scalars such as particle image velocimetry and laser induced fluorescence.

The Symposium consisted of 39 formal sessions in the following areas

- Aerodynamic Flows
- Biological Flows
- Combustion
- Complex Flows
- Engines
- Flows Instrumentation
- Free Flows
- Holographic PIV
- LDV Optics
- LDV Signal Processing
- Mixers
- Multi-point Methods
- PIV Data Processing
- PIV Optics
- PIV Signal Processing
- Scalar Measurements
- Separated Flows
- Sprays in Engines
- Turbomachinery
- Two-Phase Flows
- Vortices
- Wakes
- Wall Flows

Specialized topics, including "Novel Ideas for Instrumentation", "Instrumentation Developments", "Results of Measurements of Wall-Bounded Flows", "Free Flows and Flames" and "The flow and Combustion in Engines", were explored and resulted in detailed discussions from which the participants have gained to improve their skills in Fluid Mechanics. In general, there was a continuing and healthy interest in the development of understanding of new methodologies and implementation in terms of new instrumentation

This meeting was attended by nearly 400 scientists and engineers from more than 30 different countries throughout the world (see list of participants). The overall success of the meeting was attributed to their orientation as far as theoretical and practical ideas were concerned.

The technical sessions were held in the conference rooms of the Calouste Gulbenkian Foundation in Lisbon, Portugal. It included modern air conditioned lecture rooms capable of seating more than 100 attendees, together with a large amphitheatre and a concourse area which was by the Manufacturers' to Exhibit their Equipment.

In addition, this Ninth Symposium took place in parallel to the EXPO'98, the Lisbon World Exhibition, which has the central theme "The Oceans, A Heritage for the Future". In addition to being a festive occasion, with all the spectacle and excitement associated with this type of event, EXPO'98 is also intended to enhance knowledge resources offered by the Oceans and motivate the international community to consider the importance of this heritage and the responsibility in preserving it for the future generations. Special arrangements were provided to the Symposium participants and their guests to visit EXPO'98.

The social programme included two banquets and a series of tours, which were particularly directed to accompanying guests. The first was held in the ROYAL COACH MUSEUM and the second at the VALE DA CARVA, some 20 kilometers north of Lisbon. In both cases, the banquet dinners were organized to stimulate informal discussions and provide a friendly environment for the participants and their companions.

All the papers that were accepted for presentation were incorporated in two Proceedings Volumes which were distributed at the time of the Symposium, to all the participants. Following the meeting, the Organizing Committee has prepared a book with selected and extended papers to be published, in a hard volume, by Springer-Verlag.

Prof. Manuel Heitor  
Dept. of Mechanical Engineering Instituto  
Superior Tecnico,  
Av. Rovisco Pais, 1096 LISBOA CODEX  
PORTUGAL,  
Tel: 351-1-841 73 79,  
Fax: 351-1-849 61 56,  
E-mail: mheitor@termcomb. ist.utl.pt

**Report on the First International Symposium on  
On-Line Flow Measurement of Particulate Solids (OFMPS'98)  
July 14-15, 1998, University of Greenwich, Chatham Maritime, UK**

by Y. Yan

The development of adequate instrumentation for the on-line flow measurement of particulate solids has been found to be an intractable problem world-wide for many years due to the difficult nature of the flow medium and the variability of plant operating conditions. This first ever International Symposium, held on the prestigious Medway Campus of the University of Greenwich in Chatham Maritime, UK, attracted more than 60 delegates from 12 different countries, including New Zealand, Australia, Japan, P R China, India and USA. Given the highly focussed topics of the event and the relatively short timescale between inception and the event itself, the organisers were very pleased with the international composition and the active participation of the attendees. The event provided truly an international forum for academic researchers and industrialists to exchange ideas, knowledge and experience in the developments of sensors and instrumentation systems for on-line, continuous measurements of velocity, concentration and mass flow rate of particulate solids.

The Symposium started with a short introduction to the event by the Symposium Co-Chairman - Professor Alan R Reed. Presented at the event were some 30 papers which were divided into six technical sessions according to their technical relevance, though there were obvious overlaps between the various technologies:

- \* Ultrasonic and Acoustic Techniques
- \* Electrostatic and Capacitive Techniques

- \* Mechanical and Thermodynamic Techniques
- \* Modelling and Software Techniques
- \* Tomographic Techniques
- \* Miscellaneous Techniques and Review.

A small-scale industrial exhibition took place in parallel with the technical sessions. A number of prototypes and new commercial products relevant to the scope of the Symposium were exhibited at the event. The Symposium was closed with a guided tour of the facilities at The Wolfson Centre For Bulk Solids Handling Technology at the University of Greenwich.

The Second International Symposium on On-Line Measurement of Particulate Solids is being planned and will be held in Year 2000. To obtain further information on the forthcoming event and/or purchase a copy of OFMPS98 Proceedings (75 pounds (sterling) per copy including packing and postage), please contact:

Dr Y. Yan  
School of Engineering  
University of Greenwich  
Medway Campus  
Chatham Maritime  
Kent, ME4 4TB, UK  
Tel: +44 (0)1634 883495  
Fax: +44 (0)1634 883153  
Email: y.yan@gre.ac.uk

**To Members**

For forthcoming data bank on Multiphase Flow Research/Researchers, ICeM would like to have your personal data. Please write your name, address, research field and a list of papers etc. to the Editor.

ICeM would also be very grateful to receive recent reprints, along with up to five keywords per paper.

ICeM welcomes research articles on multiphase flow or articles on personalities in the field for inclusion in the future Newsletters. It would be very helpful if the manuscripts are sent by E-mail or diskettes are attached to the manuscript submitted.

**Report on "11th International Heat Transfer Conference"  
August 23 - 28, 1998, Kyongju, Korea**

by J. S. Lee

The 11th International Heat Transfer Conference was held in Kyongju, Korea, August 23-28. This Conference was organized by the Korean Society of Mechanical Engineers under the auspices of the Assembly for International Heat Transfer Conferences (President: Prof. G. H. Hewitt, Imperial College of Science, Technology & Medicine, UK). The chairman and secretary of the Organizing Committee were, respectively, Prof. Sung Tack Ro and Prof. Joon Sik Lee of Seoul National University, Korea.

The Conference comprised a Plenary Lecture, Key-note Sessions, Poster Sessions, a Photo Gallery Session, a Short Course, a Workshop, a Panel Discussion and Committee Meetings. The Plenary Lecture was delivered by Prof. G. H. Hewitt, Preseident of AIHTC, with the title "Name, Number and Unit". 24 keynote lectures on the-state-of-the-art heat transfer topics were presented by distinguished scholars from all over the world, 526 general papers were presented in the Poster Sessions, 23 papers were presented in Open Forum Session in parallel with general papers, and 15 presentations in Photo Gallery Session.

A Short Course was provided for two days before the Conference on "Thermal Packaging of Microelectronic Components". The lecturers were Prof. Avram Bar-Cohen, University of Minnesota, USA and Prof. Seung-Mun Yoo, University of Texas-Arlington, USA. A full day Workshop on "Microscale Thermophysical Engineering" was organized by Prof. Mansoo Choi, Seoul National University, Korea, Prof. Arun Majumdar, University of California, Berkeley, USA, Prof. Chang-Lin Tien, University of California, Berkeley, USA, and Dr. Akira Yabe, AIST, MITI, Japan. A Panel Discussion on "Advances in Computational Heat Transfer", which was sponsored by International Centre for Heat and Mass Transfer on the occasion of the 30th anniversary of its establishment, was chaired by Prof. Graham de Vahl Davis, University of New South Wales, Australia.

Seven volumes of the Proceedings were published and distributed to the participants on site. The hard bound version of the Proceedings will be distributed by Taylor & Francis.

At the meeting of Assembly for International Heat Transfer Conferences, the 13th Conference was decided to be held in Sydney, Australia, 2006. The 12th Conference has already been decided to be held in Grenoble, France, 2002 at the previous Assembly meeting. The AIHTC also approved Portugal as a new member country.

The registration statistics and number of papers in specific heat transfer fields are as follows:

11th IHTC Registration Statistics

Country	General	Student	Sub Total
Australia	8	3	11
Belgium		1	1
Brazil	8		8
Canada	10	2	12
China	28	1	29
Czech Republic	2		2
France	35	4	39
Georgia	1		1
Germany	32	5	37
India	5		5
Iran	1		1
Israel	13		13
Italy	9	1	10
Japan	124	21	145
Korea	132	15	147
Lithuania	3		3
Malaysia		1	1
New Zealand	2		2
Norway	2		2
Pakistan	1		1
Poland	6		6
Portugal	2		2
Russia	15	4	19
Singapore	1		1
South Africa	4	2	6
Spain	1		1
Sweden	5	2	7
Taiwan	11	2	13
The Netherlands	5	1	6
Turkey	2		2
U.K.	16	3	19
U.S.A.	81	11	92
<b>Country Total</b> : 33	<b>565</b>	<b>79</b>	<b>644</b>

Number of paper in specific fields

applied heat transfer	41
condensation and direct contact gas/liquid heat transfer	22
external forced convection	13
heat transfer augmentation	28
natural convection	33
conduction and thermophysical properties	17
gas turbine heat transfer	17
heat exchangers	43
impinging jet heat transfer	14
mixed convection	17
two-phase flow with and without phase change	38
flow boiling	24
freezing melting and solidification	25
internal forced convection	27
measurement techniques	28
particulates porous media and spcial application	26
heat transfer in nuclear and conventional heat and power generation system	13
numerical techniques and modeling	32
pool boiling	30
radiation and combustion	37

Prof. J. S. Lee  
Dept. of Mechanical Engineering  
Seoul National University  
Tel: +82-2-880-7117  
Fax: +82-2-883-0179  
E-mail: jslee@gong.snu.ac.kr

**Report on "5th Asian Thermophysical Properties Conference (ATPC '98)"  
August 30-September 2, 1998, Seoul, Korea**

by Min Soo KIM

The 5th Asian Thermophysical Properties Conference (ATPC '98) was held at the Convention Center of Seoul National University in Korea. The conference started on August 30 (Sunday), and ended on September 2 (Wednesday). On the whole, 169 participants from 17 countries joined the Conference. During the conference, 128 papers were presented in 4 parallel sessions.

The main objectives of this Conference were to provide an opportunity for scientists, researchers, and engineers of diverse experiences to exchange current information and new ideas on the thermophysical properties of various fluids and solids. It also aimed at presenting and discussing recent research and development activities, present state of the art, and future directions in this area for science and engineering applications.

The papers were presented in 29 sessions and major session names were as follows; aqueous system, thermophysical properties of fluid, transport properties of fluid, fluid theory and models, fluid phase equilibria, alternative refrigerants, thermophysical properties of supercritical and near-critical fluid, thermophysical properties of solid, transport properties of solid, thin films, high temperature melts, optical technique, radiative properties, computer simulation and models, measurement methods, measurements for industrial applications, and database. Two volumes of 644 pages containing the Conference papers were published.

National Organizing Committee was established back in 1997 with 12 members of various majors. Among them, Prof. C. Rhee of Korea University and Prof. S. T. Ro of Seoul National University co-chaired the Conference and Prof. M. S. Kim of Seoul National University contributed as Secretary General.

This Conference was sponsored by the Society

of Air-Conditioning and Refrigerating Engineers of Korea (SAREK) and the Korean Society of Thermophysical Properties (KSTP). The Korea Research Foundation (KRF) supported the Conference financially.

During the Conference, Shinsung Hitec Corp. and Mettler Toledo Korea Ltd. joined the exhibition.

The registration fee for the Conference was US\$300, which included copies of the two volumes of Proceedings, welcome reception (August 30), lunches (August 31 and September 1), coffee breaks, and banquet (September 1). Special registration fee of US\$100 was available for full-time non-salaried students without the copies of the Proceedings.

During the Conference, several tour programs were provided including the tour in Seoul city, Korean folk village, and the post-conference tour to Kyongju city.

Some papers presented during the Conference will be published in the special issues of International Journal of Thermophysics and Fluid Phase Equilibria. The guest editor for International Journal of Thermophysics is Prof. S. T. Ro of Seoul National University, and Prof. C. S. Lee of Korea University will act as a guest editor for Fluid Phase Equilibria.

Homepage service for the conference is still open at the following internet site; <http://atpc98.snu.ac.kr>.

Prof. Min Soo KIM  
Dept. of Mechanical Engineering  
Seoul National University  
Seoul 151-742, KOREA  
Tel : +82 2 880 8362  
Fax : +82 2 883 0179  
E-mail : [minskim@plaza.snu.ac.kr](mailto:minskim@plaza.snu.ac.kr)

### All Correspondence Concerning

News items of general interest to IChem members, notice of future meetings and conferences, personal news items, new books, etc. should be addressed to the editor or to regional corresponding members. It will be very helpful if any manuscripts proposed for publication are sent by E-mail or if diskettes are also attached to the manuscripts.



**Report on the IUTAM-CISM International Summer School on  
Advanced Turbulent Flow Computations  
Udine, September 7-11, 1998**

by CISM

The topic of the School comprised two closely connected main subjects: modelling and computation. The former subject is concerned with the fundamental and practical aspects of fluid-dynamic modelling of turbulent flows. With the availability of high-performance computers different levels of approximation can be employed in the modelling process. The approximations being used at present range from asymptotic theories, for the construction of wall functions for example, to hierarchies of closure assumptions for the Reynolds stresses, when the Reynolds averaged Navier-Stokes equations or simplifications thereof are being used, to large-eddy simulations, requiring only the turbulent subgrid quantities to be modelled, and to direct simulations, in which the flow is attempted to be described without introducing any approximation.

The latter subject is concerned with the development of efficient and yet extremely accurate numerical solutions to the conservation equations. The numerical solutions involve, in general, the generation of a mesh, offering sufficient resolution of the flow to be simulated, the discretization of the conservation equations with improved high-order techniques, and the solution of the resulting linear or nonlinear algebraic equations. The constraint for time-efficiency is dictated by the usually large number of mesh points necessary to simulate complex turbulent flow.

The presence of specialists among the most recognized in the field has permitted not only a presentation of the newest progress but also a

fruitful confrontation of the various ways of approach of turbulence computations. direct numerical simulation, large eddy simulation and Reynolds averaged Navier-Stokes equations. In particular, the field of application of each of these approaches has been clearly shown and the connection between them has been pointed out. The various aspects were discussed and illustrated by the presentation of typical examples of turbulent flows (boundary layer, mixing layer, jet and wake, flow around body, shock wave-boundary layer interaction, reacting flow,...) with special attention to industrial applications.

The lectures were carefully prepared and well presented. The lecture notes will be published by Springer Verlag, Wien-New York in 1999.

The participation in the course was very high: 56 scholars from 17 different countries. Making use of the IUTAM contribution and the financial sources of the Centre 18. participants received full or partial support (exemption from the registration fee, free accommodation, living expenses).

The very high level of the lectures as well as the active participation of the attendees made this School a real success.

CISM - International Centre for Mechanical Sciences

Palazzo del Torso, Piazza Garibaldi 18  
33100 UDINE, Italy

TEL:+39 432 248511 (6 lines)

FAX:+39 432 248550

<http://www.uniud.it/cism/homepage.htm>

---

**Message from Prof. Afgan**

October 12, 1998

Dear Colleague

Recently, I have attended the International Conference on Advancement in Mechanical Engineering in Sarajevo. I met many of my friends at the Mechanical Engineering Faculty. All attendees of the Conference have been exposed to the devastation which the war has left. All books from the library have been burned so that they do not have any book. In this respect I would like to invite you to join me and send them at least one book from your shelf. If each of us will send them one book they will be again able to join us in the new development in our field what they have mist during the war.

The address of the Dean of Mechanical Engineering Faculty in Sarajevo is :

Prof. E. Seferovic

Dean

Mechanical Engineering Faculty

University of Sarajevo

Vilsonovo Setaliste, 9

71000 Sarajevo, Bosnia and Herzegovina

Tel. +38771 653055

Fax: +38771 617205

I would highly appreciate if you will pass this message to your friends who are willing to join us in assistance to our colleges in Sarajevo.

With best regards

Prof. Naim Hamdia Afgan

UNESCO Chair Holder

Instituto Superior Tecnico

Av.Rovisco Pais, Lisbon, Portugal

Tel: +351 1 8418082

Fax:+351 1 8475545

E-mail: [nafgan@navier.ist.utl.pt](mailto:nafgan@navier.ist.utl.pt)

**Report on The 9th European Symposium on Comminution and Classification  
September 8-10, 1998  
Ecole des Mines, Albi France**

by John Dodds

The 9th European Symposium on Comminution and Classification was held in the Ecole des Mines at Albi in France from 8 to 10 September 1998. There were about 200 participants from 19 different countries with approximately a third coming from France, a third from other European countries and a third from other countries of the world. Approximately half of the participants came from industry and half from academic institutions.

The meeting was opened each day with a plenary lecture each day followed by three parallel oral sessions where some 83 papers were presented. In addition there was an 'open' session to give participants the possibility of presenting very recent work in the form of a poster or software. An exhibition of equipment, instruments and software was also held at the same time as the symposium.

The plenary lecture on the first day was by Dr R. Polke of BASF who's title was 'From the product and process requirements to the milling facility'. The second day was started with a plenary lecture by Dr E. Gaffet of CNRS-Belfort 'Mechano-synthesis : history, successes and future prospects'. The final day opened with the

conference 'Wet comminution in stirred media mills : research and practical applications' by Dr A. Kwade from Braunschweig. The 83 conference papers were presented in the three parallel sessions under the following themes : Machine design and practical experience, 28 papers, Modelling and simulation, 14 papers, Fundamentals, 20 papers Mechanical activation, 7 papers, Classification 4 papers and Comminution circuits and control, 10 papers.

The minerals industry was a major participant in the Symposium but there were also significant contributions on equipment and processing from the fine chemical, pharmaceutical and from the agro-food industry. A new feature in this symposium was the session titled mechanical activation with seven papers dealing with mechano-synthesis and mechano-chemistry.

The papers presented at the Symposium will be published as a special issue of the journal 'Powder Technology'. This is expected to appear in 1999. Further information and copies of the reprints can be obtained from the organiser of the Symposium, Professor J.A. Dodds of the Ecole des Mines d'Albi., (dodds@enstimac.fr, <http://www.enstimac.fr>, or from (progep@ensigct.fr)

**A Note from the Editor**

Members, who have paid the membership fee but did not send their Biographical Questionnaire, please send the Questionnaire to the Editor as soon as possible.

Members, who have sent the Biographical Questionnaire but did not pay the membership fee, should pay the fee to ICeM.

The annual membership fee is ¥3,500 (Japanese yen) (¥1,500 for members of the Japan Society of Multiphase Flow (JSMF) )

Please send your remittance to the Editor in one of the following ways.

1) *International Postal Remittance Service*

2) *Postal Giro Account*

Account Number: 00370-2-17483

Name of the Account: ICeM

3) *Citi Bank Account*

Ohtemachi Branch, Tokyo, Japan

MultiMoney Account Number: 92095054

Name of the Account: Mr. Goichi Matsui I / F / O ICeM

(Personal checks payable to Mr. Goichi Matsui I / F / O ICeM at Citi Bank are acceptable, but that depends.)

\*Personal checks are usually not acceptable in Japan.

- ICeM will send the membership card and the receipt of membership fee for those who pays the fee.
- The ICeM Newsletter is published twice a year and the next issue will be published in April 1999.
- Space may be bought in the Newsletter for advertisements. Please contact the Editor for details and rates.
- Any questions/comments are also welcome.

## The 1997 Awards of the Japan Society of Multiphase Flow

by Tomoji Takamasa

The Awards of The Japan Society of Multiphase Flow (JSMF) were established in 1993 to recognize the members' scientific and/or technological contributions, as well as activities in the fields of multiphase flow science and technology. The Award Committee (the chair, Professor G. Matsui, University of Tsukuba) of JSMF has selected the following recipients of the 1997 JSMF Awards. They were honored at the award ceremony held in the JSMF annual meeting in July, 1998.

In this year, Professor G. B. Wallis (Dartmouth College, U.S.A.) was the first honoree among non-Japanese members.

### 1. Lifetime Achievement Award

Dr. Shigeki TOYAMA

(Prof. Emeritus of Nagoya University & Vice President of Association of Powder Process Engineering and Industry)

Prof. Graham B. WALLIS

(Interim Dean, Thayer School of Engineering, Dartmouth College, U.S.A.)

### 2. Best Paper Award

Dr. Hiroyuki HASHIMOTO\* & Prof. Satoyuki KAWANO\*\*

(\*Prof. Emeritus of Tohoku University & Managing Director of Ebara Research Co., Ltd.,

\*\*Institute of Fluid Science, Tohoku University)

Prof. Shu TAKAGI & Prof. Yoichiro MATSUMOTO  
(Department of Mechanical Engineering, The University of Tokyo)

### 3. Best Technology Award

Dr. Keiichi HORI\* & Dr. Makoto AKAI\*\*

(\*Takasago Research & Development Center, Mitsubishi Heavy Industries, Ltd.,

\*\*Mechanical Engineering Laboratory, MITI)

Dr. Toshio OHARA\* & Prof. Hideomi FUJITA\*\*

(\*Denso Corporation Air-conditioning R&D,

\*\*Department of Mechanical Engineering, Nagoya University)

### 4. Young Scientist Breakthrough Award

Dr. Yasuo NIHEI

(Graduate School of Information Science and Engineering, Tokyo Institute of Technology)

Ms. Miyuki AKIBA

(Nuclear Engineering Laboratory, Toshiba Co.)

Prof. Tomomi UCHIYAMA

(Center for Information Media Studies, Nagoya University)

### 5. Fresh Scientist Award

Dr. Jun ISHIMOTO

(Institute of Fluid Science, Tohoku University)

Mr. Yasuhiro HASHIMOTO

(Graduate student, Department of Quantum Engineering and Systems Science, The University of Tokyo)

Prof. Tomoji Takamasa

Tokyo University of Mercantile Marine

Tel: +81-3-5245-7406

Fax: +81-3-5245-7336

E-mail: takamasa@ipc.tosho-u.ac.jp

### Executive Committee of The Japan Society of Multiphase Flow (1998-1999)

President	G. Matsui	(University of Tsukuba)
Vice Presidents	S. Tsunoyama	(Toshiba Corporation)
	Y. Tsuji	(Osaka University)
	A. Serizawa	(Kyoto University)
Chairman of Editorial Committee	A. Shimizu	(Kyushu University)
Chairman of Planning and Management Committee	T. Ikohagi	(Tohoku University)
Chairman of International Exchange Committee	K. Horii	(Shirayuri College)
Chairman of General Affairs Committee	T. Takamasa	(Tokyo University of Mercantile Marine)

Office of JSMF:

The Japan Society of Multiphase Flow

c/o Academic Publication & Printing Co., Ltd.

2-14-9 Kasugadenaka, Konohana-ku, Osaka, 554 Japan

Tel: +81-6-466-1588, Fax: +81-6-463-2522

e-mail: QYM02135@niftyserve.or.jp, WWW: <http://WWW.ijnet.or.jp/JSMF>

## Future Meetings

Listings include Conference Name, Place, Date and Contact.

### DOWNHOLE PRODUCTION & SUBSEA PROCESSING

Aberdeen, Scotland, November 3, 1998  
Catherine Cox, BHR Group Limited, Cranfield,  
Bedfordshire MK43 0AJ, UK  
FAX: +44-(0)1234-750074  
E-MAIL: ccox@bhrgroup.co.uk

### IMECE98-CHARACTERIZATION OF FLOW PATTERNS IN MULTIPHASE FLOW SYSTEMS

Anaheim, CA, USA, November 15-20, 1998  
Dr. Jovica R. Riznic, Atomic Energy Control Board,  
Research and Support Section, 280 Slater, P.O.Box  
1046, Station B, Ottawa, CANADA KIP 5S9  
Tel: 613-943-0132, Fax: 613-943-8954  
E-mail: riznic.j@atomcon.gc.ca

### Heat Transfer in Evaporation and Condensation; Application to Industrial and Environmental Processes - EURO THERM Seminar 62

Grenoble, FRANCE, November 17-18, 1998  
Dr. Ch. Marvillet, Fax: +33 4 76 88 51 61  
E-mail: marville@ntp.ceaf.fr  
Secretariat: Mrs M.J. BASSET  
Tel: +33 4 76 88 39 13, Fax: +33 4 76 88 51 61  
E-mail: greth@ntp.ceaf.fr, www: http://  
www.werg.casaccia.enea.it/eurotherm/seminar62.html

### IMECE '98- OPEN FORUM: UNIVERSITY-INDUSTRY COLLABORATIVE RESEARCH IN MULTIPHASE FLOW

Dr. M. C. Roco, National Science Foundation, Engineering Directorate, Suite 525, 4201 Wilson Blvd., Arlington, VA 22230, USA  
Tel: 703-306-1371, Fax: 703-306-0319  
E-mail: mroco@nsf.gov  
http://www.eng.nsf.gov/pft

### International Conference on Optical Technology and Image Processing in Fluid, Thermal and Combustion Flow.

Yokohama JAPAN, December 7-9, 1998  
Prof. M. Kawahashi, VSJ-SPIE98, Faculty of Engineering, Saitama University, Shimo-Okubo 255, Urawa, Saitama, 338-8570 Japan  
Tel: +81-48-858-3443, Fax: +81-48-856-2577, E-mail: vsjspie@vsj.or.jp, www: http://www.vsj.or.jp/vsjspie

### 6th Asian Conference on Fluidized-Bed and Three-Phase Reactors

Cheju Island, KOREA, December 8-12, 1998  
P.T.(Peter) Kim, Chairman Division of Fluidization Engineering The Korea Institute of Chemical Engineers. Secretariat: Dr. Y. Kang, Professor, Department of Chemical Engineering, Chungnam National University, Taejon 305-764, KOREA  
Tel: 82-42-821-5683, Fax: 82-42-822-8995  
E-mail: kangyong@hanbat.chungnam.ac.kr

### 13TH AUSTRALASIAN FLUID MECHANICS CONFERENCE

Monash University, AUSTRALIA, December 13-18, 1998

Secretariat: 13th Australasian Fluid Mechanics Conference, Dept. of Mechanical engineering, Monash University, Clayton, Victoria 3169, AUSTRALIA  
Tel: 61-3-9905-9646, Fax: 61-3-9905-3558  
E-mail: afmc@monash.eng.edu.au  
http://www.monash.edu.au/mecheng/seminars/afmc

### 25th National Conference on Fluid Mechanics & Fluid Power and 1st International Conference on Fluid Mechanics & Fluid Power

Indian Institute of Technology, Delhi, INDIA, December 15-17, 1998  
Prof. S. N. Singh, Organising Secretary, Dept. of Applied Mechanics, Indian Institute of Technology, Delhi, Hauz Khas, New Delhi-110 016, INDIA

### Energy-Related Process Integration Technologies - EURO THERM Seminar 52

Manchester, UK, 1998  
Prof. B. Linnhoff, Fax: +44 161 236 7439

### STAIF-99, Space Technology & Applications International Forum

Albuquerque, NM, USA, January 31-February 4 1999  
Prof. Mohamed S. El-Genk, UNM-ISNPS, Farris Engineering Center, Room 239, Albuquerque, NM 87131-1341, Fax: 505-277-2814, Email: mgenk@unm.edu  
Maureen Alaburda, UNM-ISNPS,  
Tel: 505-277-0446, Fax: 505-277-2814  
Email: alaburda@unm.edu, www: http://www.chne.unm.edu/isnps/isnps.htm

### A. Conference on Life and Microgravity Sciences and Applications

Raymond P. Whitten, NASA Headquarters  
Fax: 202-358-1996

### B. Conference on Global Virtual Presence

Christine Anderson, Air Force Research Laboratory,  
Fax: 505-846-6243

Peter Ulrich, NASA Headquarters, Fax: 202-358-0357

### C. Conference on Applications of Thermophysics in Microgravity & Breakthrough Propulsion Physics

Ad Delil, National Aerospace Laboratory, NETHERLANDS, Fax: 31-5272-48229

Mare Millis, NASA Lewis Research Center,  
Fax: 216-977-7537

### D. Conference on Next Generation Launch Systems

Harry Karasopolous, Air Force Research Laboratory,  
Fax: 973-255-5419, William A. Gaubatz, The Boeing Company, Fax: 714-896-5855

### E. 16th Symposium on Space Nuclear Power and Propulsion

Michael G. Houts, Los Alamos National Laboratory,  
Fax: 505-665-4336  
William J. Emrich, NASA Marshall Space Flight Center, Fax: 205-544-7504

### 24th International Technical Conference on COAL UTILIZATION and FUEL SYSTEMS

Florida, USA, March 8-11, 1999  
Coal Utilization & Fuel Systems Conference Commit-

tee 1156 Fifteenth Street, N. W., Suite 525, Washington, D. C. 20005, Barbara A. Sakkestad(CSTA) or Scott Smouse(FETC/ASME-FACT), Tel:202/296-1133,Fax:202/223-3504,E-mail: barbarasak@aol.com

### **PHEOLOGY IN THE MINERAL AND ENERGY INDUSTRIES**

Oahu, Hawaii, March 14-19, 1999

Prof.David V. Boger, University of Melbourne Chemical Engineering Department, Parkville,Vic3052 Australia, Tel: 61-39-344-7440, Fax:61-39-344-88, E-mail:davidbogger.chemeng@muwaye.unimelb.edu.au Engineering Foundation, 3Park Avenue-27th Floor-New York, NY 10016, Tel: 1-212-509-7836, Fax: 1-212-509-7441, E-mail:engfnd@aol.com  
www:http://www.engfnd.org

### **9th Workshop on Two-Phase Flow Predictions**

Helle(Saale), Germany, April 13-16,1999

Prof. M. Sommerfeld, Martin-Luther-Universitat Halle Wittenberg Fachbereich Verfahrenstechnik D-06099Halle,Germany  
TEL:+49-3461-462879, FAX:+49-3461-462878  
E-MAIL: martin.sommerfeld@vt.uni-halle.de

### **ICHMT PLASMA-99, 2nd International Symposium on Heat and Mass Transfer Under Plasma Conditions**

Antalya, TURKEY, April 19-23, 1999

(Abstracts due: October 15, 1998, for poster presentations: January 30, 1999)

Prof.Dr. Pierre FAUCHAIS, Faculte des Sciences Universite de Limoges 123 Avenue A.Thomas 87060 Limoges Cedex-France, Tel: +33-5 55 45 74 21, Fax: +33-5 55 45 72 11, Email: fauchais@unilim.fr  
Secretariat: Prof.Dr.Faruk ARINC, Mechanical Engineering Department, Middle East Technical University, 06531 Ankara, TURKEY, Tel: +90-312-210 5214, Fax: +90-312-210 1331  
Email: arinc@metu.edu.tr  
www: http://ichmt.me.metu.edu.tr

### **ICONE-7, The Seventh International Conference on Nuclear Engineering**

Tokyo, Japan, April 19-23, 1999

Hajime Akimoto, ICONE-7 Assistant Technical Chair Japan Atomic Energy Research Institute 2-4, Shirakata Shirane, Tokai-mura, Naka-gun,I baraki,J apan 319-1195

Tel: +81-29-282-5097, Fax: +81-29-2828-6427

E-mail: abst@icone7-jsme.jaeri.go.jp

### **9th International Conference CMEM 99**

#### **-Computational Methods and Experimental Measurement-**

Sorrento, ITALY, April 27-29, 1999

Prof.G.M.Carlomagno, University of Naples, Piazzale Tecchio 80125 Naples, ITALY

Prof.C.A.Brebbia, Wessex Institute of Technology, Ashurst Lodge, Ashurst Southampton, SO40 7AA, UK. Secretariat: Sally Radford, Wessex Institute of Technology, Ashurst Lodge, Ashurst, Southampton SO40 7AA, UK, Tel: 44-0-1703-293223, Fax: 44-0-1703-292853, Email: sradford@wessex.ac.uk

### **Second Asia-Pacific Conference on Combustion, National Cheng Kung University**

Tainan, Taiwan, May 9-12, 1999

( Four copies of full manuscript with four pages in ASME format due: October 31, 1998).

Prof. H.H. Chiu, Fax: 886-6-2389940, E-mail: hhchiu@htindl.iaa.ncku.edu.tw

### **Fluid Particle Interactions V**

Santa Fe, New Mexico, May 9-14, 1999

(Abstract due: October 31, 1998)

Prof.John G.Yates, Department of Chemical Engineering University College London Torrington Place, London WC1 E7JE, UK

Tel: 171-419-3837, Fax: 171-383-2348

Email: john.yates@ucl.ac.uk

Dr.John.S.Maulbetsch, EPRI 3412 Hillview Avenue Palo Alto, CA 94304, USA Tel: 415-855-2438, Fax: 415-855-2287, E-mail: jmaulbet@msm.epri.com

### **PSFVIP-2, The 2nd Pacific Symposium on Flow Visualization and Image Processing**

Honolulu, Hawaii, May 16-19, 1999

Prof. S. Mochizuki, Dept. of Mechanical Systems Engineering Tokyo University of A & T Nakacho, Koganei, Tokyo 184-8588, JAPAN

Tel/Fax: +81 423-88-7088

E-mail: psfvip-2@mmlab.mech.tuat.ac.jp

www: http://www.cc.tuat.ac.jp/~psfvip-2

### **2nd International Symposium on Two-Phase Flow Modelling and Experimentation**

Pisa, ITALY, May 23-26, 1999

Dr. G.P.Celata, Heat Transfer Unit Head, Via Anguillarese, 301 1-00060 S.M. di Galeria, Rome, Italy, Tel: +39-6-3048-3905, Fax: 3026

E-mail: celata@casaccia.enea.it

Dr.Paolo Di Marco, Energy Department, University of Pisa, Via Diotallevi 2ml-56126 Pisa, ITALY,

Tel:+39-50-569-610, Fax:+39 50-569-666

E-mail: p.dimarco@ing.unipi.it

www: http://docenti.ing.unipi.it/~d6600/pisa99/

### **4th International Symposium on Engineering Turbulence Modelling and Measurements**

Corsica, France, May 24-26, 1999

Prof. W. Rodi, Institut für Hyromechanik, Universität Karlsruhe, Kaiserstraße 12, D-76128 Karlsruhe, Germany

Tel:+49-721-608-3535, Fax:+49-721-608-2202/4260

E-mail: etmm4@ifh.bau-verm.uni-karlsruhe.de

www: http://www.ifh.verm.uni-karlsruhe.de/etmm4

### **Second International Conference and Exhibition on ENVIRONMENTAL ENGINEERING**

Veszprem, Hungary, May 29-June 5, 1999

School of Environmental Engineering, University of Veszprem 8200 Veszprem Egyetem u. 10, Hungary, Tel/Fax:+36-88-425-049

E-mail: envconf@almos.vein.hu, http://www.vein.hu/academic

### **The Combustion Institute and ICHMT MCS-99, -Mediterranean Combustion Symposium-**

Antalya, TURKEY, June 19-23, 1999  
(Abstract due: November 1, 1998)  
Prof. Dr. Faruk Arinc, ICHMT Secretary General  
Mechanical Engineering Department Middle East Technical University 06531 Ankara, TURKEY  
Tel: +90-312-210 5214/1429, Fax: +90-312-210 1331/1266, E-mail: arinc@metu.edu.tr  
www: <http://ichmt.me.metu.edu.tr/upcoming-meetings/MCS-99/announce.html>

**The Second International Conference on PNEUMATIC AND HYDRAULIC CONVEYING SYSTEMS**

Davos, SWITZERLAND, June 20-25, 1999  
Engineering Foundation, 345 East 47th Street, New York, NY 10017, USA  
Tel: +1-212-705-7836, Fax: +1-212-705-7441  
E-mail: engfnd@aol.com  
<http://www.engfnd.org>

**7th International Symposium on Gas-Liquid Two-Phase Flows, 1999 ASME FED Summer Meeting San Francisco, USA, June 22-26, 1999**

Dr. Upendra S. Rohatgi, Brookhaven National Lab., Dept. of Nuclear Energy, Upton, NY 11973, USA  
Tel: +1-516-282-2475, Fax: +1-516-282-2613  
E-mail: rohatgi@bnl.gov

**4th Liquid Matter Conference**

Granada, Spain, July 3-7, 1999  
Prof. Dr. Pedro Tarazona, Departamento de Física Teórica de la Materia Condensada Universidad Autónoma de Madrid E-28049 MADRID, SPAIN  
Tel: ++34-91-3974950, FAX: ++34-91-3974907  
E-mail: pedro@fluid5.fmc.uam.es  
Prof. Dr. Roque Hidalgo-Álvarez, Departamento de Física Aplicada Universidad de Granada Campus de Fuentenueva E-18071 GRANADA SPAIN,  
Tel: ++34-958-243213 FAX: ++34-958-243214, e-mail: liquid99@ugr.es  
www: <http://www.ugr.es/~liquid99/>

**Fifth International Conference on TECHNOLOGIES AND COMBUSTION FOR A CLEAN ENVIRONMENT**

Lisbon, Portugal, July 12-15, 1999  
Prof. M.G. Carvalho, Technical University of Lisbon Portugal, Tel: 351-1-8417372, Fax: 351-1-8475545, E-mail: cleanair@esoterica.pt

**8th International Symposium on Gas-Particle Flows, ASME-JSME Fluids Engineering Conference**

San Francisco, USA, July 18-23, 1999  
Prof. David E. Stock, Dept. of Mech. & Mats. Engrg., Washington State Univ., Pullman, WA 99164-2920, USA  
Tel: +1-509-335-3223, Fax: +1-509-335-4662  
E-mail: stock@mme.wsu.edu

**3rd ASME/JSME Fluids Engineering Conference**

San Francisco, July 18-23, 1999  
ASME: Prof. M. Volkan Otugen

Tel: 561-755-4385, Fax: 516-755-4526  
E-mail: votugen@rama.poly.edu  
JSME: Prof. Shigeaki Masuda  
Tel: +81-45-563-1141, Fax: +81-45-563-5943  
E-mail: smasuda@mech.keio.ac.jp

**IJPGC-International Conference on Power Engineering-99(IJPGC-ICOPE-99)**

San Francisco, July 25-28, 1999  
ASME: Mr. William C. Stenzel  
Tel: 01-312-269-6520, Fax: 01-312-269-6122  
E-mail: wstenzel@sepril.com  
JSME: Dr. Mikio Sato  
Tel: 81-468-56-2121, Fax: 81-468-57-5829,  
E-mail: satomiki@criepi.denken.or.jp  
CSPE: Dr. Kefa Cen,  
Tel: 86-571-795-1335, 795-1153, Fax: 86-571-795-1616, 795-1358, E-mail: kfcen@sun.zju.edu.cn

**2nd International Symposium on Computational Technologies for Fluid/Thermal/Chemical Systems with Industrial Applications (ASME PVP Division Conference)**

Boston, Massachusetts, USA August 1-5, 1999  
(Abstract due: October 30, 1998)  
Dr. Vladimir Kudriavtsev for USA and Canada, Watkins-Johnson Company Scotts Valley, CA 95066, USA  
TEL: +1-408-439-4553, FAX: +1-408-243-4220  
E-mail: vladimir.kudriavtsev@wj.com.vvk0@yahoo.com  
Dr. Satoyuki Kawano for Japan and Pacific Rim, Institute of Fluid Science Tohoku University 2-1-1 Katahira, Aobaku, Sendai 980-8577, JAPAN  
TEL: +81-22-217-5265, FAX: +81-22-217-5311  
E-mail: kawano@ifs.tohoku.ac.jp  
Dr. Chris R. Kleijn for Europe and rest of the world, Delft University of Technology Kramers Laboratorium voor Fysische Technologie Prins Bernhardlaan 6 2628 BW Delft THE NETHERLANDS  
TEL: +31-15-278-2835, FAX: +31-15-278-2838  
E-mail: crkleijn@klft.tn.tudelft.nl  
Symposium Web-site: <http://www.netcom.com/~vvk>

**International Conference on Enhancement and Promotion of Computational Methods in Engineering and Science**

MACAO, August 2-5, 1999  
(Abstract due: November 1st, 1998)  
Prof. Joao Bento / Prof. Eduardo Pereira, Instituto Su  
E-MAIL: epmese@civil.ist.utl.pt

**33rd National Heat Transfer Conference EXPERIMENTAL STUDY OF MULTIPHASE FLOW**

New Mexico, August 15-17, 1999  
Dr. Jovica R. Riznic, Atomic Energy Control Board Research and Support Section 280 Slater, P.O.B 1046, Station B, Ottawa, CANADA KIP 5S9,  
TEL: 613-943-0132, FAX: 613-943-8954,  
E-MAIL: riznic.j@atomcon.gc.ca

**MINERALS BIOPROCESSING IV**

Stockholm, Sweden, August 15-20, 1999  
Prof. K.S.E. Forssberg,  
Tel: 46-920-91311, Fax: 46-920-97364,  
E-mail: Eric.Forssberg@km.luth.se  
Dr. K.Hanumantha Rao,  
Tel: 46-920-91705, Fax: 46-920-97364,  
E-Mail: Hanumantha.Rao@km.luth.se

**First International Conference on Engineering Thermophysics (Thermal Science including thermodynamics, fluid flow, heat and mass transfer, combustion, multiphase flow)**

Beijing, China, August 18-21, 1999  
( Extended abstract due: December 31, 1998)  
Prof. Jianzhong Xu , Fax: 86-10-62555581  
E-mail:xjz@etpsserver.etp.ac.cn

**Fourth International Symposium on Coal Combustion**

Beijing, China, August 18-21, 1999  
(to be held at the same place and on the same date as those for the First International Conference on Engineering Thermophysics)  
(Extended abstract due: December 31, 1998)  
Prof. Xuchang Xu, Fax: 86-10-62770209,  
E-mail: xxc-dte@mail.tsinghua.edu.cn  
Prof. Lixing Zhou, Fax: 86-10-62785569,  
E-mail: zhoulx@mail.tsinghua.edu.cn

**6th International Conference on Circulating Fluidized Beds Dechema E.V.**

Würzburg, Germany, August 22-27, 1999  
DECHEMA e.V., Cpmgress Office, Attn.: Christiane Mitter, P.O.B. 15 01 04, D-60061 Frankfurt am Main,  
Tel: +49-69-7564-280, Fax: +49-69-7564-304,  
E-mail: nick@dechema.de,  
www: <http://dechema.de/cfb-6>  
Prof.Dr. Ulrich Mueller, Forschungszentrum Karlsruhe GmbH Institut fuer Angewandte Thermo- und Fluidodynamik Postfach 36 40 76021 Karlsruhe GERMANY  
Tel:(07247)82 3450, Fax:(07247)82 4837  
E-mail: ulrich.mueller@iatf.fzk.de or secretary@iatf.fzk.de

**Single-Phase and Two-Phase Natural Circulation - EUROTHERM Seminar 63**

Genova, ITALY, September 6-8, 1999  
Prof. M. Misale  
Tel: +39 10 353 2576, Fax: +39 10 311 870;  
E-mail: misale@itec.unige.it  
www: <http://www.werg.casaccia.enea.it/eurotherm/frame.html>

**1st International Symposium on Turbulence and Shear Flow Phenomena**

DoubleTree Resort, Santa Barbara, September 12-15, 1999  
Prof.Nobuhide Kasagi, Chair of Organizing Committee, The University of Tokyo, Department of Me-

chanical Engineering, Hongo 7-3-1, Bunkyo-ku, Tokyo 113-8656, JAPAN  
Tel: +81-3-3812-2111/6417, Fax: +81-3-5800-6999  
E-mail: kasagi@thtlab.t.u-tokyo.ac.jp  
www: <http://www.thtlab.t.u-tokyo.ac.jp>

**TURBULENCE AND SHEAR FLOW PHENOMENA FIRST INTERNATIONAL SYMPOSIUM**

Santa Barbara, CA, September 12-15, 1999  
Prof. Sanjoy Banerjee, Department of Chemical Engineering University of California, Santa Barbara, CA 93106-5080, USA  
Tel:+1-805-893-3456, Fax:+1-805-893-4731  
E-mail: tsfp@engineering.ucsb.edu  
<http://tsfp.t.u-tokyo.ac.jp>

**13th International Conference on PIPELINE PROTECTION**

Edinburgh, Scotland, September 29-October 1, 1999  
Mrs. Tracey Wheeler, BHR Group Limited,Cranfield, Bedfordshire MK43 0AJ, UK  
FAX: +44-(0)1234-750074  
E-MAIL: twheeler@bhrgroup.co.uk

**NURETH-9, Ninth International Topical Meeting on Nuclear Reactor Thermal Hydraulics**

San Francisco, California, October 3-8, 1999  
Virgil E. Schrock, Tech.Prog.Chair, Department of Nuclear Engineering, University of California, Berkeley, CA 94720-1730  
Tel: +1-510-642-6431, Fax: +1-510-643-9685  
E-mail: schrock@nuc.berkeley.edu  
www: <http://www.nuc.berkeley.edu/NURETH9/>  
NURETH9.html

**Integral Methods in Science and Engineering 2000**

Alberta, CANADA, June 12-15, 2000  
Dr. P. Schiavone, Department of Mechanical Engineering, University of Alberta, 4-9 Mechanical Engineering Building, Edmonton, ALBERTA, T6G 2G8, CANADA  
Tel: (403)492-3638, Fax: (403)492-2200  
E-mail: Peter.Schiavone@ualberta.ca

**3rd European Thermal Sciences Conference**

Heidelberg,GERMANY, September 10-13, 2000  
Prof. E. Hahne, Fax: +49 711 685 3503,  
E-mail: pm@itw.uni-stuttgart.de  
www: <http://www.werg.casaccia.enea.it/eurotherm/frame.html>

**ICMF 2001-New Orleans**

New Orleans, Louisiana, USA, May 27-June 1, 2001 (tentative)  
Prof. E. Michaelides  
School of Engineering, Tulane University  
New Orleans LA 70118, USA  
Tel: +1-504-865-5764, Fax: +1-504-862-8747  
E-mail: emichael@mailhost.tcs.tulane.edu  
home page: <http://www.tulane.edu/~engradiv/emichael/index.html>

## Corresponding Members

### CANADA

#### **Prof. M.Kawaji**

University of Toronto  
TEL: +1-416-978-3064, FAX: +1-416-978-8605  
E-MAIL: kawaji@ecf.toronto.edu

#### **Prof. S.B.Savage**

McGill University  
TEL: +1-514-398-6864, FAX: +1-514-398-7361

### FRANCE

#### **Prof. J.M.Delhaye**

CEA/GRENOBLE  
TEL: +33-2-76-88-42-75, FAX: +33-2-76-88-31-96  
TLX: 320 323, E-MAIL: DELHAYE@DTP.CEA.FR

#### **Prof. G.Gouesbet**

INSA de Rouen  
TEL: +33-2-35-52-83-91, FAX: +33-2-35-52-83-90

### F.R.G.

#### **Dr. J.Domnick**

Fraunhofer-Institut fuer  
TEL: +49-711-970-1762, FAX: +49-711-970-1004  
E-MAIL: jhd@IPA.Fhg.de

#### **Prof. M. Sommerfeld**

Martin-Luther-Universitat  
TEL: +49-3461-462879(or 2806), FAX: +49-3461-462878  
E-MAIL: martin.sommerfeld@vt.uni-halle.de

### ITALY

#### **Dr. G.P. Celata**

Heat Transfer Unit Head  
TEL: +39 6 3048 3905, FAX: +39 6 3048 3026  
E-MAIL: celata@casaccia.enea.it, TLX: 613296 ENEACAI

### ISRAEL

#### **Prof. G.Hetsroni**

Israel Institute of Technology  
FAX: +972-8-432-4538  
E-MAIL: MERHGO1@TECHNION.BITNET

### JAPAN

#### **Prof. T.Fukano**

Kyushu University, Fukuoka 812-8581, Japan  
TEL: +81-92-641-9744 Ext.5440, FAX: +81-92-641-9744  
E-MAIL: fukanot@mech.kyushu-u.ac.jp

#### **Prof. M.Maeda**

Keio University, Yokohama 223-8522, Japan  
TEL: +81-45-563-1141 Ext.3120, FAX: +81-45-563-5943  
E-MAIL: maeda@mech.keio.ac.jp

#### **Prof. T.Masuyama**

Tokai University, Shimizu, 424-8610, Japan  
TEL: +81-543-34-0411 Ext.2278, FAX: +81-543-34-9840  
E-MAIL: masuyama@scc.u-tokai.ac.jp

#### **Prof. Y.Matsumoto**

University of Tokyo, Tokyo 113-8656, Japan  
TEL: +81-3-3812-2111 Ext.6286, FAX: +81-3-3818-0385  
E-MAIL: ymats@mech.t.u-tokyo.ac.jp

#### **Prof. K.Ohba**

Kansai University, Osaka 564-8680, Japan  
TEL: +81-6-388-1121 Ext.5793, FAX: +81-6-330-3370  
E-MAIL: ohbak@ipcku.kansai-u.ac.jp

#### **Prof. T.Sakaguchi**

Kobe University, Kobe 657-8501, Japan  
TEL: +81-78-803-1112, FAX: +81-78-803-1131  
E-MAIL: sakaguci@mech.kobe-u.ac.jp

#### **Prof. A.Serizawa**

Kyoto University, Kyoto 606-8501, Japan  
TEL: +81-75-753-5829, FAX: +81-75-753-5845  
E-MAIL: serizawa@kuiaie.kyoto-u.ac.jp

### KOREA

#### **Dr. M.K.Chung**

Korea Advanced Institute of Science and Technology  
Dept. of Mechanical Engineering  
TEL: +82-42-869-3002, FAX: +82-42-861-1694

#### **Prof. S.D.Kim**

Korea Advanced Institute of Science and Technology  
Dept. of Chemical Engineering  
TEL: +82-42-829-3902/3903, FAX: +82-42-829-3910  
TLX: KAISROK K45528, E-MAIL: kimsd@cais.kaist.ac.kr

### NORWAY

#### **Prof. K.H.Bendiksen**

Institutt for Energiteknikk  
TEL: +47-63-80-60-00 +47-63-80-62-01 (Direct Line)  
FAX: +47-63-81-11-68

### P.R.CHINA

#### **Prof. H.Chen**

The Ministry of Communications P.R.C  
Water Borne Transportation Institute  
TEL: +86-10-6-2018898, FAX: +86-10-6--2011659

#### **Prof. L.Zhou**

Tsinghua University  
TEL: +86-10-6278-2231/5419, FAX: +86-10-6277-5569  
TLX: 22617 QHTSC CN  
E-MAIL: zhoulx@mail.tsinghua.edu.cn

### RUSSIA

#### **Prof. R.I.Nigmatulin**

(Tyumen) Russian Academy of Sciences Siberian Branch,  
TEL,FAX: [7] 3452/ 24-36-48  
(Moscow) Michurinskiy pr. 1, Institute of Mechanics  
Lomonosov University of Moscow, Moscow, GSP, V-192,  
119899, Russia  
TEL,FAX: [7](0)95/939-30-88, FAX: [7](0)95/253-90-04  
(Int. Line), TLX: 413311

### SLOVENIA

#### **Prof. I.Zun**

University of Ljubljana  
TEL,FAX: +386-61-1254-217, FAX: +386-61-218-567  
TLX: 32240 FAKSTR 51, E-MAIL: iztok.zun@fs.uni.lj.si

### THE NETHERLANDS

#### **Prof. B. Scarlett** (tentative)

Department of Chemical Process  
TEL: +31-15-783577, FAX: +31-15-784452

### U.K.

#### **Prof. G.F.Hewitt**

Imperial College of Science, Technology and Medicine  
TEL: +44-171-594-5562 or 5563 FAX: +44-171-594-5564  
or 5604, E-MAIL: g.hewitt@ic.ac.uk

### U.S.A.

#### **Prof. C.T.Crowe**

Washington State University  
TEL: +1-509-335-8654, FAX: +1-509-335-4662  
E-MAIL: crowe@mme.wsu.edu

#### **Prof. M.Ishii**

Purdue University  
TEL: +1-317-494-4587, FAX: +1-317-494-9570

#### **Prof. R.T.Lahey, Jr.**

Rensselaer Polytechnic Institute  
TEL: +1-518-276-8579, FAX: +1-518-276-8788  
E-MAIL: lahey@rpi.edu

#### **Prof. M.C.Roco**

National Science Foundation  
TEL: +1-703-306-1371, FAX: +1-703-306-0319  
E-MAIL: mroco@nsf.gov