

Report

FLUCOME 2000 The Sixth Triennial International Symposium on Flow Control, Measurement and Flow Visualization

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Abstract: This report gives an account of FLUCOME 2000, the Sixth International Symposium on Flow Control, Measurements and Flow Visualization held in Sherbrooke, Québec, Canada from the 13th to the 17th of August 2000. It includes a presentation of the venue, the different sessions and the Proceedings as well as a short résumé of the three keynote lectures given by Y. Nakayama ("Present and Future of Visualization," K. Aoki co-author), S. Mauro ("New Developments and New Trends in Pneumatics," G. Belforte author) and M. Boulos ("Thermal Plasma Flow Visualization and Diagnostics"). The Symposium banquet was the lieu of nomination of Professor K. Tsuchiya as honorary member of the International Steering Committee. One hundred and forty four researchers from eighteen countries have registered to the Symposium.

Keywords: fluid control, fluid measurements, flow visualization, thermal plasma, heat transfer, instruments, flowmeters, pneumatics, hydraulics, fluidics, P.I.V., P.T.V., turbulence, fluid properties, jets, separated flows, flow in machinery, boundary layers, flow in conduits and pipeline.

1. The Venue

FLUCOME 2000, the sixth of the series of International Symposium on Flow Control, Measurement and Flow Visualization, was held in Sherbrooke, Québec, Canada, from the 13th to the 17th of August 2000.

FLUCOME 2000 has attracted 144 researchers coming from 18 countries. The largest delegations of participants came from Japan, Canada, France, Norway and Italy.

This International Symposium, for its first occurrence in Canada, was hosted by the research group THERMAUS of the Université de Sherbrooke with the support of the City of Sherbrooke. The environment of the Symposium, the multimedia classrooms of the Engineering Faculty, was chosen to take advantage of the typical university research atmosphere, to stimulate valuable scientific exchanges, in addition to allow each author to use the latest electronic and computer tools for their public presentation. A special attention was also given, in the organization of the Symposium, to allow graduate students and younger scientists to participate and to gain by their contacts with distinguished scientists.

The Chairman takes this opportunity to underline the patient work of the members of the Local Organizing Committee, who are Dr. Stéphane Cyr, Mrs. Patricia Fournier, Professors Nicolas Galanis and Yves Mercadier, and to thank them for the success obtained by FLUCOME 2000. The guidance of the International Steering Committee, especially that of Professors Yasuki Nakayama, Toshiharu Kagawa and Dr. Patrick Hébrard was most appreciated. The photos were taken by Stéphane Lemire.



Fig. 1. Participants to FLUCOME 2000, 14th of August 2000.

2. FLUCOME 2000: Subjects, Sessions and Proceedings

As implied by its title, the subjects of the Symposium covered research work in fluid control, flow measurement and flow visualization. In the FLUCOME 2000 edition, the list of subjects was extended to include thermal plasma in which measurements and visualization are offering new challenges. The sessions were regrouped under the following themes:

Boundary Layers	Fluid Properties	P.I.V. & P.T.V.
Flow Control	Heat Transfer	Plasma
Flow in Machinery	Hydraulics	Pneumatics
Flow Visualization	Instruments	Separated Flows
Flowmeters	Jets	Turbulence
Fluidics	Pipelines and Conduits	

Although three sessions were dedicated formally to flow visualization techniques, several authors reporting in different sessions the results of their research studies also used flow visualization techniques in their measurement or a combination of numerical and flow visualization techniques.

The Proceedings of the Symposium have been edited and recorded on a CD-ROM (*Proceedings of the Sixth International Symposium on Fluid Control, Measurement and Visualization* (ISBN 2-7622-0126-8), A. Laneville (ed.), Aug. 13-17, 2000). A research engine is included to find papers using the author's name, keywords, subject or country. The Proceedings are also currently accessible directly and freely on the Symposium website (www.callisto.si.usherb.ca/flucome2000) which is expected to remain opened for two years.

All the keynote lectures and papers have been formatted under the software ADOBE ACROBAT 4 (the Reader, a shareware portion of the software is included on the CD-ROM). In order to navigate on the website and on the CD-ROM, one has to download (free of charge) the Asiatic package directly from the ADOBE website.

3. FLUCOME 2000: the Symposium

3.1 *The Opening Ceremony*

On the 14th of August, the University President, Pierre Reid, the Mayor of the City, Jean Perreault and the Dean of the Engineering Faculty, Roger Goulet, have opened the Symposium to the 144 scientists coming from 18 countries.

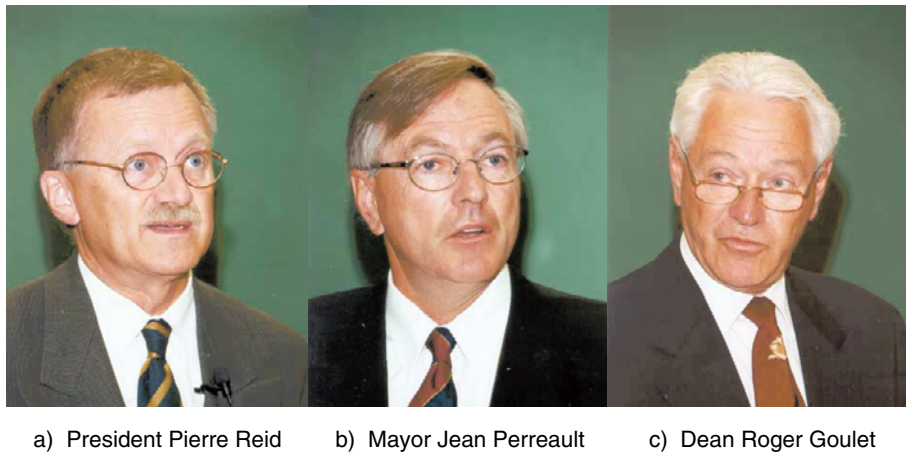


Fig. 2. The speakers at the opening ceremony.

3.2 Keynote Lectures

Each day of the Symposium began with a keynote lecture presented by an invited speaker selected among established specialists.

The first of these lectures, entitled "Present and Future of Visualization," was prepared by Professors Yasuki Nakayama and Katsumi Aoki and presented by Professor Nakayama on the 14th of August.

Using several examples, Professor Nakayama reported on visualization, describing its progressive development, its present state and applications, and the prospect of its future development. The objective of flow visualization, which is to make the invisible phenomena visible, has been set forward since early times, as the authors showed in an example which goes back 4,500 years, namely the earthen vase "Joumondoki" on which formations which resemble the von Karman vortices are represented. Among others, the important contributions to flow visualization were made by Leonardo Da Vinci, Osborne Reynolds, Ernst Mach, Ludwig Prandtl, Theodor von Karman and Stephen Kline. As for its future, the authors anticipate an expansion of visualization, as it has already done in several fields such as medical science. This expansion will rely on the utilization of electromagnetic waves in different spectra, on the development of the experimental methods using laser light and on the progress of the computer power that will handle large number of data points and allow important progresses in image analysis methods, in simulation, in measuring techniques and computer graphics.



Fig. 3. Prof. Yasuki Nakayama.

The second keynote lecture, entitled "New Developments and New Trends in Pneumatics" was written by Professor Guido Belforte and presented by his colleague Dr. Stefano Mauro on the 15th of August.

The main statement of the author is as follows: Pneumatics is a "vigorous, growing technology" because of a "continuous influx of innovative components and a strong focus on new applications." Increased performance of electric devices has forced pneumatics to make further advances and to seek for new applications. According to the author, this is translated in the current trends: optimization of component performance and their miniaturization; development of new interfaces for low power electrical or optical signals; development of innovative actuators (frictionless and flexible units); development of techniques to reduce the energetic costs associated to pneumatics; development of pneumatic servo-systems and development of flexible actuators with high power-to-weight ratio for new non-industrial applications and for non-structured environments such as bioengineering.

The third keynote lecture, "Thermal Plasma Flow Visualization and Diagnostics" was presented by Professor Maher I. Boulos on the 16th of August.

His lecture began with a brief overview of the thermal plasma generation techniques and of their principal characteristics: d.c. plasma torches, d.c. transferred arc plasmas, r.f. inductively coupled plasma torches and hybrid

d.c. / r.f. plasma torches.

Then, the author dealt with the different flow visualization techniques presently used in the case of thermal plasmas: from the still photography to the laser strobe techniques. With respect to the characterization of the different plasma generating devices, the lecturer discussed plasma diagnostic techniques such as widely used optical methods, intrusive and response limited probe techniques and signal analysis of emitted acoustic and electrical fluctuations. With respect to the particulate diagnostic techniques, these are mainly optical techniques aiming at the determination of the in-flight particle velocity, surface temperature, diameter and number flux density; according to Professor Boulos, they are the laser-Doppler anemometry, the laser strobe technique and the two-wave length pyrometry. The prognostic for future work is: "development and integration of simple and robust plasma and particulate flow visualization and diagnostic techniques for comprehension on-line process control."

3.3 At the Banquet: Professor Kiichi Tsuchiya Honored

The Symposium banquet took place in downtown Sherbrooke at the theater Le Granada, the only theater in North America that has preserved its original decoration of style "art deco" of the Thirties. A group of musicians from the School of Music of the Université de Sherbrooke provided a jazzy accompaniment to the guests' conversations. The high point of the banquet was the nomination of Professor Kiichi Tsuchiya as an honorary member of the International Steering Committee.



Fig. 4. Dr. Stefano Mauro.



Fig. 5. Prof. Maher Boulos.



Fig. 6. Prof. Kiichi Tsuchiya.

4. Conclusion: FLUCOME 2003 in Sorrento

FLUCOME 2000 has achieved its objectives to promote fruitful scientific exchanges on fluid control, fluid measurements and flow visualization between scientists from different continents. To maintain this tradition, I am pleased, as retiring Chairman of the Flucome International Steering Committee, to invite you in Sorrento, Italy, for the FLUCOME 2003 edition under the co-chairmanship of Professors Guido Belforte and Giovanni Maria Carlomagno.

Author Profile



André Laneville: He received a B.A. in Classical Studies from the Université Laval (1965), his B.Eng. from the University of Western Ontario (1969) and his Ph.D. from the University of British Columbia (1973). He then started teaching in the department of Mechanical Engineering at the Université de Sherbrooke where he obtained the rank of Professor (1983). He was an invited researcher at Monash University (Australia), at CERT-ONERA (France) and at IREQ (Québec). His fields of research are separated flows and instabilities of bluff bodies in subsonic flow as well as unsteady mixed convection in conduits. His research relies mostly on experimental simulations in wind tunnel and water channel. He has supervised 34 graduate students.