

## The 7th International Symposium on Fluid Control, Measurement and Visualization

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

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

**Keywords** : Aerodynamics, Bioengineering, CFD Applications, CFD Methods, Combustion, Compressible Flows, Cylinder Flows, Flow Control, Flow Measurements, Flow Metering, Flow Visualization, Fluidics, Heat Transfer in External Flows, Heat Transfer in Internal Flows, Hydraulics, Jets, Machine Flows, Micro Flows, Mixed Convection, Natural Convection, Optical Methods, Particle Image Velocimetry, Pneumatic Components, Pneumatics, Separated Flows, Synthetic Jets, Tunnel Testing, Turbulence, Two Phase Flows, Unsteady Aerodynamics

### 1. Introduction

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

The Symposium was organized by the University of Napoli Federico II. The University of Napoli dates back to the year 1224, when Federico II of Swabia, heir of both the Roman-German Empire and the Kingdom of Sicily, decided to create an institution whose main aim was to build up a strong and skilful team of experts to assist in ruling over his huge empire which included Southern and Northern Italy, Switzerland, Austria, Germany, Netherlands, Belgium, Czechoslovakia, Eastern

and Southern France.

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

## 2. FLUCOME '03

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



Fig. 1. The coast of Sorrento.



Fig. 2. The Tasso square.

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

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

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

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



Fig. 3. Opening ceremony.

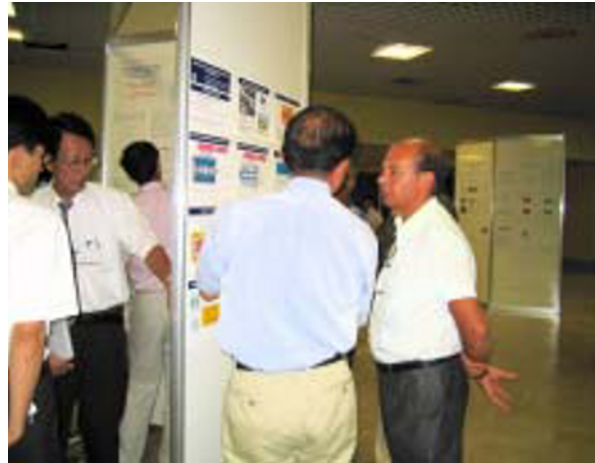


Fig. 4. Poster session.

The 237 papers, from many of the world's leading laboratories, which are contained in the CD-ROM, are indexed and the full text is searchable for keywords or according to the Symposium Program. An archive copy of the CD is lodged in the National Library of Scotland. Anyone interested in obtaining a copy of the CD-ROM Proceedings of FLUCOME'03 may contact: [ian@igrant.demon.co.uk](mailto:ian@igrant.demon.co.uk).

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

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

At the beginning of each working day, a speaker, selected among renowned specialists in different fields of fluid flow, delivered an authoritative lecture in Plenary Session. Prof. Wolfgang Merzkirch of University of Essen discussed Fluid Mechanical Problems in Flow Metering, Prof. Ching-Jen Chen of Florida A & M University described Some Aspects of Nanotechnology, Microtechnology and Biomedical Applications, and Dr. Antonello Cogotti of Pininfarina Industries treated From Steady-State to Unsteady Aerodynamics and Aeroacoustics. The Evolution of the Testing Environment in the Pininfarina Wind Tunnel while Prof. Ben T. Zinn of Georgia Institute of Technology reported on The Real Time Control of the Lean Blow Out Limit in Pre-Mixed Combustors for Reduced NO<sub>x</sub> Emissions. On the last day, Prof. A. Tamir of Ben-Gurion University of the Negev entertained the audience by considering The Interaction Between Art & Science: From Mona Lisa to Einstein.

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

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

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

Prof. B. T. Zinn discussed an active control system, to detect lean blow-out precursors and to stabilize the combustor behaviour while maintaining low NO<sub>x</sub> emissions, based on optical and acoustic measurements. The control redistributes the fuel between the main premixed flow and a pilot injector and it can accommodate also variations in flow conditions.

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

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



Fig. 5. International steering committee.

### 3. Future Symposium

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

The Symposium Chairman is Prof. Qing-Ding Wei of Peking University who is already actively working to repeat, if not to improve, the success of Sorrento's meeting. Further information is available by contacting [qdwei@pku.edu.cn](mailto:qdwei@pku.edu.cn).

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

#### *Author Profile*



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