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Report

The 8th International Symposium on Flow Visualization

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***Abstract*:** The 8th International Symposium on Flow Visualization (8ISFV) was held in Sorrento, Italy, from the 1st to the 4th of September 1998. The Symposium has attracted, by far, the largest number of participants in the history of the meeting. The 313 presented papers were distributed in 65 Technical Sessions which covered a very broad range of topics.

At the beginning of each working day, four invited speakers, selected among renewed specialists, addressed Keynotes Lectures in plenary sessions. Prof. Ronald J. Adrian related on the *Decomposition of turbulent fields and visualization of vortices and turbulent momentum transport*, Prof. G. E. A. Meier described *New optical tools for fluid mechanics*, Prof. Hiroharu Kato treated a *Research on cavitation mechanism by high-speed video and holographic observations* and Prof. Antonio Cenedese reported on the *Eulerian and Lagrangian velocity measurements by means of image analysis*.

During the Symposium three Awards were delivered to outstanding scientists in the field of Flow Visualization, namely: the Ernst Mach Award to Prof. Yoshimichi Tanida, the Leonardo da Vinci Award to prof. Wolfgang Merzkirch and the Asanuma Award to Prof. Wen-Jei Yang.

***Keywords*:** flow visualization, acoustics, advanced techniques, aircrafts, airfoils, applications, bluff bodies, cavity flows, channel flows, combustion, flow around cylinders, delta wings, droplets break-up, electrodynamics, engines, fluidics, holography, industrial processes, infrared thermography, instability, interferometry, jets, jets in cross flow, liquid crystals, low reynolds number flows, machines, medical applications, multiphase flows, natural convection, numerical visualizations, particle image velocimetry, porous media, rotating fluids, schlieren, shock waves, supersonic flows, three dimensional flows, turbomachines, turbulence, two phase flows, unsteady flow, vortices.

The 8th International Symposium on Flow Visualization (8ISFV) was held in Sorrento, Italy, from the 1st to the 4th of September 1998. The 8th Symposium attracted by far the largest number of participants in the history of the meeting. Indeed, more than 350 scientists, coming from the five continents and specifically from more than 30 countries all over the world, plus about 100 accompanying persons, attended the Symposium. The largest number of participants came from Japan, United States of America, Germany, France, Italy, United Kingdom, Canada and Russia.

The success of the Symposium has to be mainly ascribed to the patient work of the members of the International Organizing Board which included forty-five distinguished scientists in the field of flow visualization. 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 the flow visualization specialism and of the ability of its practitioners, as demonstrated by the CD ROM Proceedings (ISBN 0 9533991 0 9) which was edited by G. M. Carlomagno and I. Grant. The Proceedings took full advantage of the powerful electronic image capture and manipulation tools which have recently 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 moving images. Since the flow

visualization specialism embodies visual observation of dynamic processes, the inclusion of digital video and synthetic moving images, practically possible only in electronic publication, 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 illustrates both the high quality of the submission and the blurred position between art and science which the flow visualization holds.

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

The 293 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. An archive copy of the CD is lodged in the National Library of Scotland. Anyone interested in obtaining the CD ROM Proceedings of 8ISFV may contact: 〈ian@igrant.demon.co.uk〉.

In addition, to leave a trace of all the work being presented at the meeting, Printed Proceedings, which contain 20 very late papers, were distributed at the Symposium site. The total number of papers, 313 (CD ROM plus Printed Proceedings), was more than double that of every previous Symposium.

The Symposium actually started on Sunday night, August 30, with a warm Welcome Reception, which was held in a nice and relaxing citrus orchard nearby the meeting site, the Sorrento Palace Congress Center. The Reception was most probably an example of an asymptote of Italian buffet cuisine.

On Monday, two Technical Visits, one to the Italian Center for Aerospace Research (CIRA) in Capua and the other one to the Pomigliano D'Arco plant of Alfa Romeo Avio, took place. More than 200 participants attended these visits. The Monday night was delighted by a truly Neapolitan show which was offered by the Sorrento township.

The Opening Ceremony was held on Tuesday September 1, early in the morning, with a hearty welcome from the Mayor of Sorrento. During this Ceremony, two awards, sponsored by the Rotary Club Napoli North-East, were delivered to two outstanding scientists in the field of Flow Visualization, their choice being made on the basis of the opinion poll of all the members of the International Organizing Board of the Symposium. As shown in Fig. 1, the Ernst Mach Award was presented to Prof. Yoshimichi Tanida of Tokai University of Japan. Fig 2 shows instead the delivery of the Leonardo da Vinci Award to Prof. Wolfgang Merzkirch of University of Essen of Germany.

The intention of the Symposium's organisers in giving the two manes, Leonardo and Mach, to the two Awards was the following: Leonardo da Vinci was the first person who deliberately carried to completion flow visualizations; Ernst Mach was the scientist who first made quantitatively visible the invisible flow fields. Prof. W. Merzkirch also delivered the Leonardo da Vinci Memorial Lecture on *Flow visualization: science, art, entertainment - 21 years international symposia* in which he made a witty and agreeable history of all the previous symposia on flow visualization with sanguine reflections and a lot of amusing slides.

At the beginning of each working day, invited speakers, selected among established specialists in various fields of Flow Visualization, addressed Keynote Lectures in plenary sessions. Prof. Ronald J. Adrian discussed the *Decomposition of turbulent fields and visualization of vortices and turbulent momentum transport*, Prof. G.E.A. Meier described *New optical tools for fluid mechanics*, Prof. Hiroharu Kato treated a *Research on cavitation mechanism by high-speed video and holographic observations* and Prof. Antonio Cenedese reported on the *Eulerian and Lagrangian velocity measurements by means of image analysis*.

Fig. 1. Prof. Yoshimichi Tanida while receiving the Ernst Mach Award.

Fig. 2. Prof. Wolfgang Merzkirch while receiving the Leonardo da Vinci Award.

Prof. Adrian addressed the differences between the several types of decomposition technique which exist for revealing the underlying structure of the velocity fields and gave indication about the most appropriate one to be used for the specific application. In particular, he pointed out that the Reynolds decomposition is the best choice for the analysis of statistics while the Large Eddy Simulation decomposition is superior in visualizing vortices.

Prof. Meier analysed the importance of the flow visualization techniques in fluid mechanics because of the high resolution imaging systems and the rich details content which lead to new insights into flow phenomena. He considered in details four different topics: vortex obstacle interaction, PIV, LDV and Pressure Sensitive Paints.

Prof. Kato discussed the serious problems linked to the cavitation phenomenon and dwelt upon the need for novel visualization techniques in order to better understand its mechanism and consequently adopt prevention counter-measures.

Prof. Cenedese described the application of a Particle Tracking Velocimetry in the analysis of two different laboratory simulations of environmental importance: the flow in a porous media and a convective atmospheric boundary layer.

The sixty five Technical Sessions held during the Symposium covered the following topics: Acoustics, Advanced techniques, Aircraft, Airfoils, Applications, Bluff bodies, Cavity flows, Channel flows, Combustion, Flow around cylinders, Delta wings, Droplets break-up, Electrodynamics, Engines, Fluidics, Holography, Industrial processes, Infrared thermography, Instability, Interferometry, Jets, Jets in cross flow, Liquid crystals, Low Reynolds number flows, Machines, Medical applications, Multiphase flows, Natural convection, Numerical visualizations, Particle image velocimetry, Porous media, Rotating fluids, Schlieren, Shock waves, Supersonic flows, Three dimensional flows, Turbomachines, Turbulence, Two phase flows, Unsteady flow and Vortices.

During the Social Banquet, which occurred on Thursday night September 3, another very important award was made to a scientist who has devoted most of his life to flow visualization. As shown in Fig 3, Prof. Wen-Jei Yang of University of Michigan, USA, had the joy to receive the First Asanuma Award from the very hands of Prof. Tsuyoshi Asanuma who first started, in Tokyo in 1977, the series of International Flow Visualization Symposia. The Banquet ended with an exciting and captivating concert of Neapolitan songs.

Finally, on Saturday September 5 a delightful day was spent 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 onboard.

The 9th International Symposium on Flow Visualization, the Millennium Symposium, will be held in Edinburgh, Scotland, from the 22nd to the 25th of August 2000, i.e. during the second week of the Edinburgh International Festival. The Symposium Chairman is Prof. Ian Grant of Heriot-Watt University who is actively working to repeat, if not to improve, the success of Sorrento's meeting. He has certainly to work very hard. Further information is available on the WWW at 〈http://www.ode-web.demon.co.uk/9misfv〉.

Therefore, let me say to all the participants of the 8th Symposium: Arrivederci in Edinburgh.

Fig. 3. Prof. Wen-Jei Yang receiving the Asanuma Award from Prof. Tsuyoshi Asanuma.

Author's Profile

Giovanni Maria Carlomagno: He became Doctor in Mechanical Engineering (summa cum laude) in 1965, Research assistant at University of Princeton (1967-68), Associate Professor of Physics (1969), Associate Professor of Gasdynamics (1975), Professor of Aerospace and Mechanical Engineering (1986). He has chaired 14 International Meetings, is editor of 14 books and author of some 200 scientific papers on Aerodynamics, Gasdynamics, Heat transfer, Fluidics, Non-newtonian fluid dynamics, Measurement techniques in thermo-fluid-dynamics, Tethered satellites, Infrared thermography, Image Processing. He is Member of the Advisory Board of the Pacific Center of Thermal-Fluids Engineering, the Scientific Council of the International Centre for Heat and Mass Transfer and of the Executive Committee of the International Council for Aeronautical Sciences, Member of the Editorial Board of more than 10 International Scientific Journals and Chairman of the Technical Advisory Committee of the von Karman Institute.