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The 10th International Conference on Fluid Control, Measurements, and Visualization

Published online: 8 April 2010
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Abstract The 10th International Conference on Fluid Control, Measurements, and Visualization (FLUCOME 2009) was held in Moscow, Russia, 17–21 August 2009. The conference FLUCOME 2009 attracted about 100 participants from 14 countries and was organized in 40 ORAL sessions, three keynote lectures, four invited lectures, one special invited lecture, and several technical exhibitions. The FLUCOME Awards were presented to three famous scientists for their merits and important contributions to the field of fluid/flow control, measurements, and visualization.

Keywords Fluidics · Flow control · Pneumatics · Visualization · Optical measurements · Velocimetry · Computational simulations

1 Introduction

The 10th International Conference on Fluid Control, Measurements, and Visualization (FLUCOME 2009) was held in Moscow, Russia, 17–21 August 2009, in the conference center of the main building of the Presidium of Russian Academy of Science. The Joint Institute for High Temperature RAS (JIHT RAS) hosted the meeting as the main organizer and scientific supervisor. Director of JIHT RAS, Academician Vladimir Fortov was the General Chair of the conference.

FLUCOME is a series of well-established international conferences. It was initiated in 1985 by the Visualization Society of Japan, under the supervision of Professor Y. Nakayama, and held successfully in Tokyo for the first time. The Table below shows the history of FLUCOME activity and some plans for the future. The number of participants in the last conference was less than the usual due to worldwide financial crisis.

	Year	Number of participants	Chair	Location
1st FLUCOME	1985	300	Professor Y. Nakayama	Tokyo, Japan
2nd FLUCOME	1988	180	Professor R. F. Boucher	Sheffield, U.K.
3rd FLUCOME	1991	200+	Professor R. L. Woods	San Francisco, CA, USA
4th FLUCOME	1994	336	Professor P. Hebrard	Toulouse, France
5th FLUCOME	1997	301	Professor K. Tsuchiya	Hayama, Japan
6th FLUCOME	2000	140	Professor A. Laneville	Sherbrooke, Canada
7th FLUCOME	2003	300+	Professor G. M. Carlomagno	Sorrento, Italy
8th FLUCOME	2005	161	Professor Q. D. Wei	Chengdu, China
9th FLUCOME	2007	175	Professor C. J. Chen	Tallahassee, FL, USA
10th FLUCOME	2009	100+	Academician V.E. Fortov	Moscow, Russia
11th FLUCOME	2011	–	Professor J.-H. Chen	Taiwan
12th FLUCOME	2013	–	Professor T. Kagawa	Japan

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The 10th FLUCOME provided a forum for researchers to exchange the latest information and technologies from large-scale phenomena of hydraulics to small scales of nano-, micro-, and bio-technology in multiple disciplines, such as engineering, physics, biological sciences, oceanography, and meteorology. Conference topics include fluid processes across a wide range of scales: micro-scale biomechanical engineering flows, small-scale machine flows, large-scale civil and environmental fluid flows, and global-scale geophysical and meteorological fluid flows. The participants came from various scientific organizations, national research organizations, university chairs, and industry-based laboratories. There is knowledge exchange of ideas in a wide range of investigation methods and innovations in the field of applications concerning fluid control, measurements, CFD, heat transfer, and flow visualization.

2 Formal issues

2.1 Organizers

Joint Institute for High Temperatures of the Russian Academy of Sciences, Central Aerohydrodynamic Institute, Semenov Institute of Chemical Physics of the Russian Academy of Sciences, The Russian Foundation for Basic Research, Department of Power Engineering, Mechanical Engineering, Mechanics and Processes of Management of RAS and International Aviation and Aerospace salon MAKS-2009 have hosted and sponsored the 10th International Conference on Fluid Control, Measurements, and Visualization (FLUCOME) in Moscow.

The JIHT RAS was founded in 1990–1993 on the base of the Institute of High Temperature of RAS, which was previously known as the Laboratory of High Temperatures and Research Scientific Institute of High Temperatures. In 1967, it was incorporated into the Russian Academy of Science. At the present time, the JIHT RAS is the biggest scientific center of Russia in the field of thermophysics and new aspects of energetics. The main laboratories and workshops are located in Moscow. At the same time, some branches and test ranges are placed rather far outside the central region of Russia and in CIS countries. The main activities are directed at: conventional and new energy; explosion and detonation; aero- and hydrodynamics; shock waves; MHD, and plasma.

The Central Aerohydrodynamic Institute (TsAGI) was founded on 1 December 1918 under the initiative and leadership of N. E. Zhukovsky, the father of Russian Aviation. Today, TsAGI is the largest aviation scientific research center in Russia. It is the first scientific institution to combine basic studies, applied research, structural design, pilot production, and testing. During its distinguished history, TsAGI has developed new aerodynamic configurations, aircraft stability/controllability criteria, and strength requirements. TsAGI was a pioneer in the theory of flutter along with many other theories, applications, and experimental studies. Over the last several years, TsAGI established contacts with a majority of research and development centers and aircraft manufacturers in Europe, the USA, and Asia.

The Institute of Chemical Physics was organized on 15 October 1931, on the base of physicochemical Division of the Leningrad Physics-Technical Institute. The first head of the institute was N. N. Semenov, academician and Nobel Prize winner. The institute was created with the aim of “introduction of physical theories and methods into chemistry, chemical industry, and other branches of economics”. Seventy years of activity of the institute has shown that this problem has been solved. However, the main achievement of the institute’s team was the creation of a new branch of natural sciences, chemical physics. N. N. Semenov defined chemical physics as a “science describing the fundamentals of chemical transformations and the associated problems of substance structure”. This notion indicates that chemical physics has a comprehensive character, and it is not surprising that its ideas and concepts are used in all areas of natural sciences including biology and medicine.

FLUCOME 2009 was announced as a part of a business program of the International Aviation and Space Salon MAKS 2009 that was held in Zhukovsky city on 18–23 August 2009. Delegates of the conference visited the exposition of the International Aviation and Space Salon MAKS 2009 on 20 August with the aim of familiarization with the latest achievements of Russian and worldwide aviation and space branches. This visit created the platform for discussions with MAKS exhibitors.

2.2 Location

The meeting venue was the conference center main building of the Presidium of the Russian Academy of Science. This site is located not far from the Moscow center and possesses a number of facilities for

meetings. A comfortable, covered winter garden was available to the participants in addition to three spacious conference halls.

2.3 Sessions

The conference was organized into 40 scientific sessions in the frames of three traditional fields:

(A) Fluids/flow control: aerodynamics; MEMS control; hydraulic structures; optimization in flow control; environmental pollution control; plasma-assisted aerodynamics; jet flows; flows in microdevices; coastal and offshore structures; wind engineering; combustion and detonation; MHD and EHD; hydraulic, pneumatic, fluidics.

(B) Measurements: supersonic flows; multiphase flows; turbulent flows; acoustic and electromagnetic flows; compressive flows; heat and mass transfer; environmental flows; remote sensing; nonintrusive methods.

(C) Visualization and CFD: PIV and imaging; CFD; flow characterizations; biological flows; meteorological flows; visualization of scientific arts.

Three international experts were invited to present keynote lectures in various fields of activities. The selection was made based on representation of the International Steering Committee, the current host country, and the next host country.

Keynote lecture 1: Professor I. Egorov (Russia), "Boundary layer control for friction drag reduction".

Keynote lecture 2: Professor E. Rathakrishnan (India), "Corrugated Tabs for Supersonic Jet Control".

Keynote lecture 3: Professor C.-K. Chan (Taiwan) "Turbulent drag reduction and degradation of DNA".

In addition, one special invited lecture and four regular invited lectures were presented by distinguished scholars and were discussed with great interest.

Special invited lecture: Professor Y. Nakayama (Japan), "Promotion of health by water veil".

Invited lecture 1: Professor V. Molkov (UK), "Hydrogen non-reacting and reacting releases: overview and state-of-the-art".

Invited lecture 2: Professor D. Markovich (Russia), "Digital imaging of two-phase shear flows".

Invited lecture 3: Professor T. Kagawa (Japan), "Vortex levitation".

Invited lecture 4: Professor V. Sabelnikov (France), "Visualization study of thermoacoustic instabilities in a backwardfacing step stabilized lean-premixed flame in high turbulence flow".

2.4 Exhibitions

A technical exhibition allowed to present the recent optical components and accessories (EBM fluorescent powder, etc.), high-speed cameras (Photron FASTCAM, "SEDATEK"), imagery and velocimetry systems ("LaVision"), scientific books and publications ("Torus-Press"), new measuring methods (JIHT RAS).

2.5 Conference statistics

Scientific sessions: 40 in 4 working days

Participating countries: China (12), France (2), Germany (1), India (1), Japan (31), Jordan (1), Korea (4), Netherlands (1), Russia (36), Singapore (1), Switzerland (1), Taiwan (8), UK (2), USA (1)

Keynote lectures: three (Russia, Japan, Taiwan)

Special invited lecture: one (Japan)

Invited lectures: four (Japan, France, UK, Russia)

Social events: three (welcome reception, conference dinner, farewell party)

Special event: one (MAKS 2009 Aviation and Space Saloon and Aeroshow)

FLUCOME Awards: three (USA, Japan, Russia)

3 International Steering Committee meeting

The meeting of the International Steering Committee and Local Organizing Committee was held on Tuesday, 18 August in the Conference Center. The agenda included the following clauses:

1. Formal report on FLUCOME 2009 (Dr. S. Leonov, Program Chair);
2. Discussions on the FLUCOME Awards and voting of new member of the honorary board;
3. Information on FLUCOME 2011 (Professor J.-H. Chen, Dean of College of Engineering, National Taiwan Ocean University);
4. Information on FLUCOME 2013 (Professor T. Kagawa, Tokyo Institute of Technology)

4 Discussion

The International Steering Committee of FLUCOME has concluded that the 10th conference, which was held in Moscow, was successful and achieved its objectives and goals. In recognition of the professional standing and great merit, the International Steering Committee and Organizing Committee of FLUCOME 2009 have declared that Professor Ching-Jen Chen of Florida A & M University Florida State University has been admitted to the grade of FLUCOME Honorary Board Member. Also, in recognition of the professional standing and great merit in the fields of visualization, flow control, and measurements, the International Steering Committee and Organizing Committee of FLUCOME 2009 have declared that Professors C.-J. Chen (FSU, USA), Toshio Kobayashi (JARI, Japan), and Victor Kozlov (ITAM RAS, Russia) are awarded certificates of merit and the commemorative keepsakes.

The International Steering Committee of FLUCOME 2009 has decided to organize the next FLUCOME 2011 in Taiwan under the chair of Professor J.-H. Chen, Dean of College of Engineering, National Taiwan Ocean University. The recommended time is December 2011. The conference FLUCOME 2013 is suggested to be hosted by Japan (Professor T. Kagawa).

5 Social program

5.1 Welcome reception

The welcome reception took place at the famous venue, Moscow Central Hippodrome, on Tuesday, 18 August. Comfortable buses delivered participants to this famous place. Central Moscow Hippodrome, founded in 1834, is the largest horse racing track as well as horse breeding research facility in Moscow and Russia. It is the oldest in Europe.

5.2 Conference dinner

The conference dinner was arranged in the famous park and chateau “Tsaritsino”, “Opera House” being perfectly adapted for such an event. Tsaritsino is an amazing place to see: a huge, roofless pseudo-gothic structure, with bridges, follies, lots of woods to walk in, and ponds. It is a wonderful place to relax on a sunny day. Its history goes back to the sixteenth century, when Tsarina Irina, the wife of Tsar Fyodor Ioannovich, had an estate here. In the seventeenth century, this area was the property of the Boyar family Streshnev, and later of the Prince Golitsyn. In 1712, Peter the Great presented the estate, which was then called Chornaya Gryaz (Black Mud), to the Moldavian Prince Kantemir, whose writer son sold it to Catherine the Great for 25,000 rubles in 1775. She changed its name to Tsaritsino, and envisaged an estate to match her glorious summer palaces outside St. Petersburg. Construction work was resumed in 1786 by Matvei Kazakov, who was another prominent architect of that time. Kazakov devoted over a decade to the project until its abrupt termination in 1797 after the empress’s death. After that, Tsaritsino lay abandoned for years. A museum was established in 1984 and several of its buildings have been restored and are being used for various purposes.

The dinner was started after observing a minute of silence in memory of Professor R. F. Boucher, Honorary Board Member, who passed away this year.

At the beginning of the dinner, the FLUCOME Awards were announced as well as the change in the Honorary Board. Some participants from different countries made short speeches to express their gratitude to the organizing committee.

The concert of string orchestra and Russian songs by an accomplished singer was appreciated with prolonged applause.

5.3 Farewell party

The farewell party was organized in the winter garden of the Conference Center on the afternoon of Friday, 21 August. After this, most participants departed to the Center of Moscow to visit the Kremlin and other interesting places.

Acknowledgments First of all, we would like to thank all the participants, authors, exhibitors, and session chairs for their participation, leading to the success of the conference. The International Honorary and Steering Boards helped efficiently in the worldwide distribution of information. We express our thankfulness to Professor Y. Nakayama, whose continuous interest in the conference was very considerate. We convey our special thanks to the local organizing team, particularly to the secretary and his assistants, executive partner of the FLUCOME 2009 “Torus-Press”, and also the travel agent. The financial supports from The Russian Foundation for Basic Research, Department of Power Engineering, Mechanical Engineering, Mechanics and Processes of Management of RAS are greatly appreciated as well as the support of the JIHT RAS Directorate.