

*Review of ISTP-16: Pacific Center of Thermal-Fluids
Engineering in the Heart of Europe
(August 29th-September 1st 2005, Prague)*

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1. Introduction

The 16th *International Symposium on Transport Phenomena* (ISTP-16) was held from August 29th to September 1st in Prague, Czech Republic. According to the organizers, the purpose of the ISTP series is to offer a platform for multidisciplinary meeting of researchers, scientists and practitioners for exchange of information and discussion in the area of transport phenomena.

The choice of the *Pacific Center of Thermal-Fluids Engineering* (PCTFE) to situate the most recent assembly of its ISTP series to Prague appears somewhat paradoxical from geographical point of view. Pacific region, with the World's largest ocean, dramatic landscapes infamous for vivid volcanic and tectonic activities, is rarely associated with the Czech Republic, a small country right across the globe, at the very center of Europe, characteristic by peaceful hilly landscape, which is old and stable even on geological time-scale, and with no sea whatsoever. However, geographic reasons are just about irrelevant among scientific communities of the present age.

The Czech host and the partner in organizing ISTP-16 was the *Faculty of Mechanical Engineering of the Czech Technical University in Prague*. The Czech Technical University (CVUT - abbreviation of its Czech name) is naturally proud on its long tradition (it was formally established in the year 1707), as well as on the fact that it is still the leading technical university in the Czech Republic, currently with 7 faculties, just above 20,000 students, and 3,000 members of staff. The Faculty of Mechanical Engineering itself has celebrated 140 years anniversary last year, and at present has almost 5,000 students at all degree levels.



Fig. 1 Symbols of the organizers: PCTFE and CVUT.



Fig. 2 View of the Prague Castle across the Vltava River spanned by the 15th century Charles Bridge.



Fig. 3 Main building of the Faculty of Mechanical Engineering of CVUT in Prague. (Source: CVUT)

2. Participation statistics

The efforts of the organization committee led by Prof. Jan Ježek for CVUT and Prof. Sadanari Mochizuki for PCTFE were rewarded by wide international interest. In all, 457 authors and co-authors from 30 countries participated in preparing contributions for ISTP-16. The number was dominated by authors from Japan, 182, or almost 40%. The next largest number of authors was from Taiwan (about 20%) and the Czech Republic (10.5%).

The final number of attending registered participants reached 178 from 17 countries, which was even stronger dominated by Japan, from where 43% of the participants came, with the Czech Republic (22%) and Taiwan (15%) being again the other most represented countries. Altogether, the participants from the Pacific region counted for more than 63% of the participants. The statistics of participants are summarized in Figure 4.

Aside Prof. Ježek and Prof. Mochizuki as the main organizers, the participants were greeted at the opening ceremony by the president of PCTFE, Prof. Wen-Jei Yang, who welcomed wide international participation, stressed importance of transport phenomena in modern science and technology, and also mentioned his surprisingly long and intensive relationship with the hosting city of Prague. On behalf of CVUT, the participants were welcomed by the dean of the Faculty of Mechanical Engineering of CVUT Prof. Petr Zuna, and member of the international organizing committee Prof. Jiří Šesták.

3. Contributions

3.1 Plenary lectures and overview of sections

In the course of the symposium, the participants had the opportunity to attend three plenary lectures given by Prof. Ichiro Tanasawa (“An Outlook on Cryobioengineering with Primary Focus on Cryopreservation”), Prof. Yildiz Bayazitoglu (“Nano-to-Macro scale Modeling of Photonics Thermal Transport”, presented by Prof. Wen-Jei Yang), and by Prof. Jiří Šesták (“Transport Phenomena and non-Newtonian Fluid Mechanics in Mechanical Engineering”).

Other, some 105 oral presentations and 31 posters

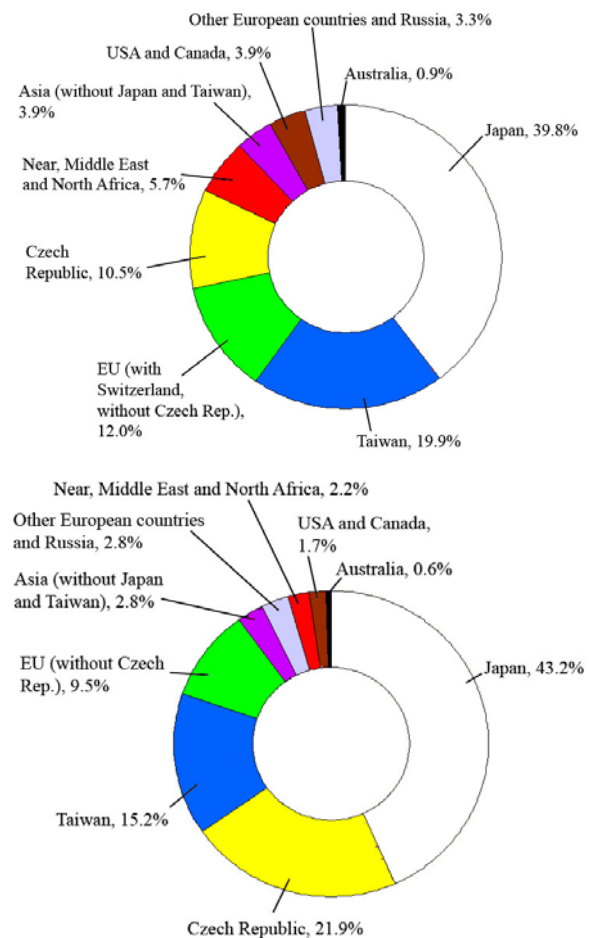


Fig. 4 Statistics of nationalities of all authors and co-authors (above), and registered participants (below).



Fig. 5 Opening ceremony. From the left: Prof. Jan Ježek (main organizer), Prof. Petr Zuna (dean of the Faculty of Mechanical Engineering of CVUT), Prof. Wen-Jei Yang (president of PCTFE), Prof. Jiří Šesták (international organizing committee), and Prof. Sadanari Mochizuki (main organizer and vice-president of PCTFE). (Source: CVUT)

Table 1 Statistics of presented contributions by section.

Section	Oral	Posters	Total
Turbulence and flow instabilities	11	3	14
Two phase flow	9	4	13
Chemical process systems	3	-	3
Environmental systems	5	4	9
Fluid dynamics in micro-systems	13	4	17
Heat and mass transfer	31	11	42
Rheologically complex systems and biofluid dynamics	6	-	6
Heat exchangers	3	-	3
Electronic equipment cooling	4	5	9
Boundary layer and free shear flows	8	3	11
Experimental and computational fluid dynamics - gases	10	3	13
Experimental and computational fluid dynamics - liquids	10	5	15
Combustion and reacting flows	13	3	16
Industrial aerodynamics and wind engineering	2	3	5
Totals	128	48	176

were divided into 20 sections. The list of all sections, and number of oral and poster presentation in each section is given in Table 1, from which it is seen that the section “Heat and Mass Transfer” was the largest with total number of 42 contributions.

3.2 Heat and mass transfer section

From the best evaluated presentations in the Heat and Mass Transfer section, rather large number of contributions was related to heat or mass transfer in pulsating and oscillating flows. Prof. M. Hishida presented heat transport of superposed oscillatory and slow steady flow in a loop channel, demonstrating up to 40-fold increase of thermal energy transport rate with small increase of work done by the flow. Similar system inspired by avian lungs was analyzed experimentally and numerically, as reported in the presentation of E. Sakai, with accent on generation of the steady flow component in avian lungs, flow patterns, and their influence on augmented mass transport – rather modest attitude of the young presenter did not harm the presentation, which was among the best the present reviewer had seen during ISTP-16. Prof. H. Saitoh presented systematic study of flat plate oscillating in a flow in vertical rectangular channel, based on hydrogen bubble flow visualization,



Fig. 6 First plenary lecture given by Prof. Ichiro Tanasawa (above). The keynote speakers Prof. Tanasawa and Prof. Šesták during their presentations (below, left and right photo respectively). (Source: CVUT)

color schlieren method visualization of thermal boundary layer and local heat transfer measurement.

Several presentations from the section of Heat and Mass Transfer were related to the effects of strong magnetic fields on fluid flows and heat transfer in various settings. Prof. J. Szymd reported on results of numerical simulation of natural and magnetizing convection of air, as a representative of paramagnetic fluids, in a cubic space with temperature difference between opposing walls, with particular interest in possibilities of control of heat transfer by varying orientation of the strong, 10 Tesla, magnetic field. Prof. H. Ozoe presented results on effect of strong magnetic field on water mist behavior, again demonstrating wide possibilities for control of this kind of flows by magnetic means.

Numerical study combining effects of heat and solute diffusion together with buoyancy effects was

used to analyze complex phenomena of double diffusive natural convection of block of light hot solution in water, as presented by Prof. K. Kamakura. The size of the initial solute block was shown to significantly affect the formation of salt-fingers, with a single finger being formed in the case of small block, while wide spreading with large number of fingers occurred in the case of larger blocks.

Other topics, among many others in Heat and Mass Transfer, included impingement heat and mass transfer of synthetic jet (Dr. Z. Trávníček), effect of Görtler vortices on heat transfer on concave wall (P. Sobolík), or two views on the problem of perspiration and cloth comfort (Prof. A. Narumi and K. Machová).

3.3 Fluid dynamics in micro-system and other sections

Although PCTFE has recently started its series of International Symposia on Micro and Nano Technology (ISMNT), the recent popularity and importance of this topic was to be witnessed also during ISTP-16, proof of which is that “Fluid Dynamics in Micro-Systems” formed with 17 contributions the second largest section of the conference. Three out of five of the best received presentations of this section were related to flow visualization and velocity field measurement in micro and nano domains. Prof. Uemura presented modification and application of holographic system for 3D PIV in micro-domains. Particle tracking Velocimetry of ferromagnetic nanoparticles using dark-field optical microscope system was applied to study of the effect of magnetic field on the growth and dispersion processes of cluster formation in microchannel flows, as presented by Prof. H. Kikura. High frequency PIV was used for study of micro-sheath flow inside a micro flow cytometer, presented by Prof. M.-W. Wang.

Liquid slip in microchannels (C.-Y. Soong), flows with nanoparticles (presentations of C.-C. Chieng and P.-Y. Hsiao), and study of deposition processes in inkjet printing (T.-M. Liou) were among other numerous topics presented in this vivid area. Naturally, other 12 sections of ISTP-16 brought large number of various other topics, even short review of which is

beyond the scope of the present article.

4. In closing

If the present reviewer felt that some points of the organization of ISTP-16 would deserve further improvement, these were rather in the reign of common issues shared by practically all similar meetings, than particular shortcomings of this interesting meeting. Unfortunately, strikingly low was the participation of female researchers. There were just about 10 women participants, or some 5% - huge disproportion reasons for which are certainly worth some consideration. Another matter that the present reviewer would like to see at similar meetings is somewhat stricter, clearly stated and more strongly enforced policy on participants' conduct from the organizers, for example to save other participants from last moment cancellations without explanation.

Being the 13th largest city of the enlarged European Union, and enjoying unprecedented interest of foreign



Fig. 7 The historical building of the Bethlehem chapel hosted concert of classical music for all organizers, participants and their company. (Source: CVUT)

and domestic investors, city of Prague is rapidly regaining its position of important business, scientific and cultural center. Nevertheless, the historical charms of the city of Prague and the Czech Republic are untouched and inescapable. The organizers therefore facilitated tourist tours to Prague and nearby Karlštejn castle for participants and their accompanying persons. The cultural peak of the conference was the concert of classical European music in the historical building of the Bethlehem chapel, which is used as the representative space of CVUT.

The meeting therefore delivered what it promised – bringing closer fluid dynamics, transport, and heat transfer communities of two remote regions, the Pacific region and the Central Europe, with wide international participation from other regions, into a motivating scientific and cultural encounter. The next meeting, ISTP-17, is scheduled on September 2006

back “home” in the Pacific region, Toyama, Japan. If it follows the ISTP series tradition, it will be an event worth fitting in into ones schedule.



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