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Special issue dedicated to the 5th World Conference on Experimental Heat Transfer, Fluid Mechanics, and Thermodynamics (ExHFT-5) Thessaloniki, Greece, September 24–28, 2001

Novel applications and new products, especially of mechanical, chemical, aerospace, materials, energy and nuclear engineering, rely on advances in thermal sciences. Even with the recent advances in numerical analysis, experimental research retains a critical place in thermal and fluid sciences for the verification of theory and analysis. Although experimental work is costly and time consuming, high quality experimental data are essential and critical in the design and operation of many large and complex systems, especially those relying on new technologies. Experimental data are also essential in suggesting directions for further research. Experimental work is the underpinning and motivation of new ideas, both theoretical and practical. Advancement in the understanding of detailed heat transfer and fluid flow phenomena affects the complexity of experiments undertaken as well as overall approaches and the sophistication of the instrumentation employed.

In order to bring together experimental researchers and those in industry who are active in the areas of thermal and fluid science and engineering, to exchange their expertise, experiences and insights in many research areas in a spirit of cooperation and friendship, and to further stimulate their research activities, a series of Conferences was started in 1988 on Experimental Heat Transfer, Fluid Mechanics, and Thermodynamics. The two first World Conferences on Experimental Heat Transfer, Fluid Mechanics, and Thermodynamics (ExHFT) were held in Dubrovnik, while the third ExHFT Conference took place in Honolulu, and the fourth in Brussels. Finally, the 5th World Conference on Experimental Heat Transfer, Fluid Mechanics, and Thermodynamics (ExHFT-5), was held in Thessaloniki, Greece, during September 24–28, 2001.

A total of 358 Contributed Papers, 14 Keynote lectures, plus two Nusselt–Reynolds Prize Lectures have been accepted for presentation at the ExHFT-5 Conference, and included in the Conference Proceedings after a peer review process. The number of the papers and the variety of subjects addressed attest to the continued vitality and vigour of experimental work. The papers cover a broad spectrum from the experimental investigation of complex fundamental physical phenomena to the study of practical devices and applications, dealing with boiling, condensation, combustion,

convective flow, process equipment, heat and mass transfer and its enhancement, jets, measurement techniques, multi-component and multiphase flow, thermalhydraulics, fluid dynamics, nuclear reactor safety.

On the basis of the Conference Scientific Committee recommendations, 36 papers have been selected for publication in a special issue of this Journal, which provides an international archival forum for research, emphasizing experimental work that enhances basic understanding of heat transfer, fluid mechanics and thermodynamics. The selection covers a wide spectrum of basic research and applications, and provides an insight of recent research in boiling, condensation, combustion, and heat transfer.

Five papers are dealing with boiling, and are related to:

- the motivation, experimental results and understanding in pool boiling heat transfer under reduced gravity conditions;
- recent research carried out at the Institut für Energietechnik, TU Berlin, Germany, dealing with steady-state and transient pool boiling of FC-72, water and isopropanol, water jet impingement, use of special sensors (optical probes and microthermocouples);
- boiling of saturated FC-72 on square pin fin arrays aiming at the heat transfer enhancement;
- a photographic study of near-wall bubbles in subcooled flow boiling, which reveals the existence of the liquid sublayer between vapour blankets and heated walls (so far, the basic hypothesis of the liquid sublayer dryout theory for the modeling of subcooled critical heat flux in flow boiling);
- the analysis of the pressure influence on boiling heat transfer coefficient in a closed two-phase thermosyphon loop.

Four papers are dealing with condensation, and are related to:

- the heat transfer coefficient evaluation of a zeotropic refrigerant mixture (R-22/R-142b) in a smooth horizontal pipe, and of a pure refrigerant (R-134a) and a

zeotropic mixture (R-134a/R-23) on enhanced surface tubes (Gewa C+ tube);

- in-tube condensation experiment of R-410A for smooth tube, helical micro fin tube, and three types of herringbone micro fin tubes;
- the enhancement of condensation heat transfer caused by EHD method for condensate drainage from horizontal finned tube.

Two papers are dealing with liquid falling film heat transfer (also of interest for condensation on tubes), and are related to:

- local and instantaneous heat transfer of laminar-wavy films using an infrared technique;
- thermocapillary convection heat transfer in a falling thin liquid film locally heated.

The remaining four papers are dealing with:

- the effect of axial tube location on heat transfer in a circulating fluidized bed;

- the research priorities on scale formation in tubular heat exchanger;
- NO_x emission from high-temperature air/methane flame;
- the characterisation of thermal radiation properties of dispersed media.

We hope that a clear picture of what discussed at the ExHFT-5 Conference is coming from the selection of papers published in this special issue kindly hosted in this Volume of the *International Journal of Thermal Sciences* (a special thank is due to the Editor-in-Chief Prof. André Lallemand). Research in thermal sciences scores a significant contribution from the works presented and discussed in Thessaloniki, and the most significant of them have been presented in this issue for a hopefully archival interest.

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Paolo Di Marco
Guest Editors