

Thermal Issues in Emerging Technologies

This special issue of the Journal of Heat Transfer contains six papers selected out of the 53 presented at the Second International Conference on Thermal Issues in Emerging Technologies, Theory and Applications (ThETA2) held in Cairo, Egypt in December 17–20, 2008. Emerging technologies in various domains, including microelectronics, nanoscience and engineering, smart materials, microelectromechanical systems, biomedical engineering, and novel energy conversion approaches present many challenging and interesting thermal effects and interactions. In many applications, such effects become a dominant factor in determining the overall performance or response. ThETA2 theme topics included micro- and nanoscale heat transfer, modeling of multiscale heat transfer problems, thermal modeling of electronic systems, temperature aware computer systems design, cooling of electronic systems and data centers, compact thermal models, thermomechanical effects, MEMS—multiphysics problems, new and renewable energies, solid-state energy generation/cooling, fuel cells, energy conservation, energy—buildings—environment, multiphase flow with heat transfer, thermal issues in biomedical engineering, thermal issues in microfabrication technology, thermal issues in new materials, computational methods in heat transfer, and advanced experimental methods in heat transfer.

The success of ThETA1, held in Cairo, Egypt in January 3–6, 2007, which attracted 37 papers from around the globe, preceded ThETA2. ThETA2 attracted 17 papers from United States and Canada, 17 from Europe, 13 from Asia, 5 from Egypt, and 1 from the Arab World. Keynote lectures included (alphabetically) Suresh

Garimella, Yogesh Jaluria, Yogendra Joshi, Satish Kandlikar, Clemens Lasance, Robert Moffat, Alok Rastogi, Mohamed-Nabil Sabry, Ali Shakouri, Gerald Sonnenfeld, Rao Tummala, and Kazuaki Yazawa. Conference executive committee included Bernard Courtois, Yogendra Joshi, Waturu Nakayama, M.-N. Sabry, and Bahgat Sammakia. The conference was chaired by M. N. Sabry and co-chaired by B. Courtois.

Selected papers appearing in this Special Issue were reviewed again following the conference. These papers cover a range from fundamental to practical issues. The review paper by Jaluria and Yang focuses on microscale transport in the thermal processing of new and emerging advanced materials. The paper by Sabry addresses generalization of the heat transfer coefficient concept for system simulation. The paper by Kawanami et al. models a regenerative magnetic refrigeration system with particle-packed bed. Mancin et al. addressed heat transfer performance of aluminum foams with air flow. Leong et al. focused on convective thermal transport in graphite foam heat sinks with baffle and stagger structures. Yamamoto presented a model for flow and heat transfer in diesel particulate filter.

The Guest Editors hope that the community finds these papers of value, just as the conference attendees did.

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