

From the guest editors

About this special issue

Thermodynamics is a powerful tool that scientists and engineers can use to attain a deeper understanding of how naturally organized systems arise and evolve. More important, engineers have applied the principles of thermodynamics, fluid mechanics, and heat and mass transfer to construct models that account for the inherent irreversibility of processes executed by systems, both natural and man-made. In particular, entropy generation minimization is an approach to thermodynamic optimization that provides considerable insight into the organization of the natural world. In the process of performing such analyses, engineers determine the entropy that a system generates as a function of its parameters, including size, shapes, and materials. Engineers can go to optimize the system's performance given their constraints.

When engineers design a device or system, they must first understand its purpose. The device must perform a function, subjected to given constraints. The engineer conceives and designs it, optimizes its design, constructs it, makes it work, and optimizes its performance. The unique understanding that engineers can offer in the search for the origins and evolution of naturally occurring structures is that many designs for such structures have nearly the same overall performance as the optimal design engineers could conceive, even though they may differ in their details. This engineering insight helps to account for the evolution of naturally occurring systems governed by energy and mass flow and subjected to geometric and size constraints.

The International Symposium on "Thermal-Fluid Science and Engineering" was focused on wide variety of thermal engineering topics, such as: minimization of entropy generation, heat transfer enhancement, convection in porous media, thermal management of electronic systems, exergetic analysis, and constructal theory.

The topics were discussed from different aspects in enlightened form in the papers presented at the Symposium. It has been privilege and great pleasure of the editors of this Special issue of the journal *Thermal Science* to have the possibility to select some of the papers to be introduced to this special edition.

The editors are very grateful to the authors and reviewers for their assistance in preparing of this issue. In particular, we express our deep gratitude to Professor Simeon Oka, the Editor-in-Chief of the journal *Thermal Science*, who has played the most important role in preparation of the issue.

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