

EDITORIAL

Practical problems encountered in energy conversion systems, like different chemical reactors, furnaces, boilers, etc., involve complicated geometries, complex boundary conditions and variable thermodynamic properties and cannot be solved analytically. Sufficiently accurate approximate solutions can be obtained by using numerical methods based on mathematical models. Development of submodels describing individual processes, as well as comprehensive numerical codes is increasing at a significant pace across the world. The need for modeling is most apparent in complex flows, like turbulent reactive flows with heat and mass transfer in energy conversion systems. Simulations made with such models and codes offer great potential for use in analysis and optimization of the processes with respect to energy efficiency improvements and emission reduction.

This special issue offered an opportunity to researchers, dealing with various aspects of numerical analysis of heat and mass transfer in different systems for conversion of energy, to share their research findings and ideas. Experts working in this and related fields were invited to present the latest achievements and developments in their work in order to provide a broad view of the subject.

The scope of the issue includes modeling, simulation and analysis of heat and mass transfer and additional processes in energy conversion systems and other related topics of interest. A wide range of applications are discussed, from boiler furnaces (burning fossil, as well as biomass fuels) to internal combustion engines. Both development and application of the models are considered. Future needs and challenges in the field are also pointed out. The emphasis is given to the numerical optimization of processes with respect to the efficiency and emission. The issue consists of five papers (one review and four original research articles) reflecting progress in investigations, carried out recently by researchers worldwide. I hope it will be useful for scientists, engineers, teaching staff and students interested in this research area of increasing importance.

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