

**Preface: Special Issue for the 2nd International
Symposium on Thermal-Fluid Dynamics (ISTFD2021)
(Editorial)**

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PREFACE: Special issue for the 2nd International Symposium on Thermal-Fluid Dynamics (ISTFD2021)

Thermal-Fluid Dynamics is the fundamental to a wide range of engineering subjects such as energy, power, environment, energy saving and storage, renewable energy, aerospace, astronautics, combined heating, cooling and power technology, nuclear energy, hydrogen energy, automotive, mechanical engineering, emerging and interdisciplinary subjects such as zero carbon technologies, micro- and nano-fluidics, advanced thermal processes and others. It plays a key role in the development and breakthrough of scientific theories, innovative technologies and revolution of industry and human society systems. With the rapid development of various relevant interdisciplinary subjects and new technologies, the research of thermal and fluid dynamics is growing fast. Development of advanced knowledge, new theory and innovative technologies is urgently needed. For example, applications of microscale and nanoscale thermal and fluid flow phenomena involved in traditional industries and highly specialized fields such as micro-fabricated fluidic systems, high heat flux cooling in microelectronics and decarbonized heating and cooling technology etc. have been becoming particularly important since the late 20th century. Furthermore, interdisciplinary research areas relevant to thermal-fluid dynamics are rapidly developing. Newly emerging research areas require understanding of fundamentals, mechanisms and applications of the microscale and nanoscale fluid flow and thermal transport phenomena. Complicated multiphase and thermal processes are the core stone in modern industry, high technology development, highly efficient energy conversion and utilisation, renewable and sustainable energy technologies and environment protection, just to name a few here.

In order to foster an environment conducive to exchanging new research ideas and progress of the fundamental and applied research of thermo-fluid dynamics. An annual series of International Symposium on Thermal-Fluid Dynamics (ISTFD) was founded by Prof. Bofeng Bai of Xi'an Jiaotong University, China, Dr. Lixin Cheng of Beijing University of Technology, China/Sheffield Hallam University, UK and Dr. Qinling Li of Sheffield Hallam University, UK and Prof. Liangyu Zhao of Beijing Institute of Technology, China in 2019. The goal of ISTFD is to gather scientists, researchers and industrial engineers from all over the world to present the latest research results, theoretical and modelling development, experimental methodology, practical design and industrial applications in the field of Thermal-Fluid Dynamics. It provides an excellent platform to share new research findings and ideas and promote extensive research collaboration and extend social networking. The ISTFD series is aimed at becoming one of the leading international annual symposiums in the fields related to Thermal-Fluid Dynamics including the relevant cutting-edge and interdisciplinary subjects. The Inaugural Symposium (ISTFD2019) was successfully held in Xi'an, China in 2019. Following the great success of ISTFD2019 held in Xi'an, China and the 2nd International Symposium on Thermal-Fluid Dynamics (ISTFD2021) was successfully held in Beijing, China on 31 July to 3rd August 2021. Due to the effect of Covid'19, hybrid modes of onsite and online were adopted with attendance of more than 400 scientists, researchers, industrial engineers and research students from 14 countries. The topics include Aerodynamics, Multiphase Flow, Heat and Mass Transfer, Combustion, Particle, Bubble and Drop Dynamics, Spray and Mixing, Cavitation and Cavitating Flow, Experimental Methods/Techniques, Computation Methods, Engineering Applications and interdisciplinary research topics.

To reflect the recent progress in the research on thermal-fluid dynamics, this special issue contains 6 peer reviewed papers specially selected from ISTFD2021. It covers correlation, modelling, experimental and numerical studies of Thermal-Fluid Dynamics: (1) New flow-pattern-based heat transfer correlations for water in micro/mini-channels; (2) Effects of fluid--solid wall heat transfer on the achievable simulated solid wall contact angles in

pseudopotential Lattice Boltzmann method with different ghost fluid layers constructed at a solid wall; (3) Effects of thermal boundary conditions on heat transfer characteristics of supercritical water; (4) Experimental investigation on flow excursion of supercritical hydrocarbon fuel in horizontal parallel channels with nonuniform heat flux boundary; (5) A limiter of discontinuous finite element method for thermal radiation heat transfer and (6) Numerical study of flow and heat transfer characteristics in shell-and-plate heat exchangers.

It is our great pleasure to present this special issue on the state-of-the-art research in relevant topics of Thermal-Fluid Dynamics to the community. We would like to express our great thanks to all authors and reviewers who have contributed to the special issue. It is also our great wish that the special issue can provide advanced and innovative research, inspiration, and reference for future research of Thermal-Fluid Dynamics. We hope that readers can benefit from the state-of-the-art research in various research topics in the selected papers.

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