Editorial

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Biographical notes: Andreas Öchsner is a Full Professor of Lightweight Design and Structural Simulation and Vice Dean for Research at the Esslingen University of Applied Sciences, Germany. After completing his Dipl-Ing in Aeronautical Engineering at the University of Stuttgart, in 1997, he served as a research and teaching assistant at the University of Erlangen-Nuremberg from 1997 to 2003 while pursuing his Doctor of Engineering Sciences degree. From 2003 to 2006, he was an Assistant Professor in the Department of Mechanical Engineering and Head of Cellular Metals Group affiliated with University of Aveiro, Portugal. He spent seven years (2007–2013) as a Full Professor in the Department of Applied Mechanics, Technical University of Malaysia. From 2014 to 2017, he was a Full Professor at the School of Engineering, Griffith University, Australia, and Head of Discipline and Program Director of Mechanical Engineering.

Luiz Alberto Oliveira Rocha obtained his PhD in the Duke University, USA, MEng in PUC, RJ, Brazil and BEng in IME, RJ, Brazil. He is a Professor of the Mechanical Engineering and Production and Systems Engineering, University of Vale do Rio dos Sinos, UNISINOS, Brazil, and invited Professor at Mechanical Engineering Graduate Program, Federal University of Rio Grande do Sul, Brazil. Currently, he is a coordinator of the Graduate Program in Production and Systems Engineering at University of Vale do Rio dos Sinos, UNISINOS, Brazil.

Antonio F. Miguel is an Associate Professor of Physics at the University of Évora, and member of Institute of Earth Sciences (Pole of Évora), Portugal. He received his BSc and MSc from the University of Évora, Portugal. In 1994, he attended the graduate school at the WU-R, the Netherlands, completing his PhD in 1998. His research covers interdisciplinary physics and applied physics: fluid dynamics, thermodynamics, heat transfer, design of flow systems and pedestrian dynamics.

Optimisation of heat transfer and fluid flow systems plays an important role in many areas of science and engineering. This special issue is dedicated to the recent advances in this very broad field, and contains a selection of the papers presented at the special session 'Fluid flow, energy transfer and design' of 15th International Conference on Diffusion in Solids and Liquids (DSL-2019), held in Athens, Greece.

The papers presented here include theoretical, computational, experimental, and their mixtures, of fundamental or applied nature. To improve the efficient usage of the available energetic resources, Caetano et al. present a thermodynamic model and perform numerical calculations to optimise the configuration of heat regenerators in a combined Brayton/Rankine cycle. Natural zeolite can be used as a heat storage material for photovoltaic thermal systems (PVTS). Kandilli and Mertoglu present a numerical optimisation of the design and operation parameters of PVTS with natural zeolite. For the safe operation of high-performance microprocessors, critical heat flux is an important design parameter. Ariyo and Bello-Ochende study numerically critical heat fluxes for the optimised microchannels at selected optimised velocity ranges and heat fluxes. Martins et al. present a numerical study about the configuration for the best power generation as a triangular arrangement of vertical H-Darrieus wind turbines. The paddle-shaft component is the key part of a paddle heat exchanger. Al-Kbodi et al. perform simulations to obtain the entropy generation rate of paddle-shaft components. Plates are key structural components in the ship hull, aircraft fuselage, bridges, and many other systems. Pinto et al. present a numerical study of the mechanical structural behaviour related to the maximum deflection of stiffened plates with rectangular or trapezoidal stiffeners. Some natural and synthetic porous media are pro-fractals. Motivated by this evidence, Miguel presents analytical models to study the permeability fractal porous materials composed by bundles of tubes and by dendritic networks of tubes.

We would like to thank all the authors for their efforts in preparing the manuscripts. We are indebted to the reviewers for their insightful comments. Last but not least, we would like to thank Professor Xiong Zhou for the invaluable help and guidance throughout, and to Professor Yimin Shao the Editor-in-Chief of the *International Journal of Hydromechatronics*. We hope that the papers presented in this volume will inspire further developments in the area of heat transfer and fluid flow systems.