

Editorial

## Special Issue “Fluid Flow and Heat Transfer”

Artur J. Jaworski 

School of Computing and Engineering, University of Huddersfield, Queensgate, Huddersfield HD1 3DH, UK; a.jaworski@hud.ac.uk

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Fluid flow and heat transfer processes play an important role in many areas of science and engineering from the planetary scale (e.g., influencing weather and climate) to microscopic scales of enhancing heat transfer by the use of nanofluids; they also underpin the performance of many energy systems understood in the broadest possible sense. This topical special issue is dedicated to the recent advances in this very broad field. The main criteria for paper acceptance were academic excellence, originality and novelty of applications, methods or fundamental findings. All types of research approaches were equally acceptable: experimental, theoretical, computational, and their mixtures; the papers could be both of fundamental or applied nature, including industrial case studies. With such a wide brief, it was naturally very difficult to define a finite list of relevant disciplines. However, it was broadly anticipated that the authorship and ultimate readership would come from the fields of mechanical, aerospace, chemical, process and petroleum, energy, earth, civil and flow instrumentation engineering, but equally biological and medical sciences, as well as physics and mathematics; that is, everywhere where “fluid flow and heat transfer” phenomena may play an important role or be a subject of worthy research pursuits. Cross-disciplinary research and development studies were also most welcomed.

The response to this special issue invitation was very impressive. We received 85 manuscripts. A strict refereeing process adopted by the editorial team of *Energies* meant that only 25 papers made it to the final special issue. Also, in the process, some papers were judged not suitable for the special issue, but generally of suitable standard for the regular issues of *Energies* and those were transferred over to alternative editors and subsequently published elsewhere. Publishing this special issue was of course a team effort, and thanks are due to all involved, in particular a group of reviewers who have to remain anonymous, my colleagues from the editorial board of *Energies* and the tireless editorial team led by Ms. Julyn Li, without whom the special issue would have never succeeded.

For obvious reasons, the range of topics covered by the papers is very diverse. However, to help bring an order to this motley collection of works, I have attempted to identify a few main themes in which the contributions were made. These are listed below, the ultimate one being named “Miscellaneous Problems” as a reflection of my futile attempts to associate these papers with other themes. This is by no means a reflection on the academic excellence present in these papers.

The first theme can be arbitrarily defined as “**Turbomachinery and boundary layer flow**” to include the following works:

- “Analysis of Different POD Processing Methods for SPIV-Measurements in Compressor Cascade Tip Leakage Flow” by Shi et al. [1];
- “Unsteadiness of Tip Leakage Flow in the Detached-Eddy Simulation on a Transonic Rotor with Vortex Breakdown Phenomenon” by Su et al. [2];
- “Effect of Rotor Thrust on the Average Tower Drag of Downwind Turbines” by Yoshida et al. [3];
- “POD Analysis of Entropy Generation in a Laminar Separation Boundary Layer” by Jin and Ma [4];
- “Experimental Investigation of Flow-Induced Motion and Energy Conversion of a T-Section Prism” by Shao et al. [5].

Here, the traditional “turbomachinery” topic has been widened to include the aerodynamics of wind turbines [3]. Usually turbomachinery incorporates boundary layer flows and boundary layer separation processes which was the logic behind grouping paper [4] under this heading. The last paper deals with flow-induced motion for harvesting of flow energy [5] which is related to vortex induced vibrations and hence its loose association with boundary layer flows and separation.

The second theme is defined as “**Heat transfer and heat exchangers**”. This is relatively self-explanatory and includes a mix of numerical and experimental works of both fundamental and applied nature in heat transfer and design of heat exchangers. The contributions are as follows:

- “Flow Structure and Heat Transfer of Jet Impingement on a Rib-Roughened Flat Plate” by Alenezi et al. [6];
- “Numerical Study on Thermal Hydraulic Performance of Supercritical LNG in Zigzag-Type Channel PCHes” by Zhao et al. [7];
- “A Machine Learning Approach to Correlation Development Applied to Fin-Tube Bundle Heat Exchangers” by Lindqvist et al. [8];
- “A Numerical Study on the Light-Weight Design of PTC Heater for an Electric Vehicle Heating System” by Kang et al. [9];
- “Unsteady Simulation of a Full-Scale CANDU-6 Moderator with OpenFOAM” by Kim et al. [10].

The third group of contributions fits rather well the traditional field of multiphase flows, specifically “**Two-phase flow**” (gas–liquid), due to the type of problems considered in the papers. The contributions included:

- “Visualization Study on Thermo-Hydrodynamic Behaviors of a Flat Two-Phase Thermosyphon” by Wang et al. [11];
- “Gas–Liquid Two-Phase Upward Flow through a Vertical Pipe: Influence of Pressure Drop on the Measurement of Fluid Flow Rate” by Ganat et al. [12];
- “Investigation on the Handling Ability of Centrifugal Pumps under Air–Water Two-Phase Inflow: Model and Experimental Validation” by Si et al. [13].

The fourth theme of research that emerged can be referred to as “**Flow with micro- and nano-scale features**”. This includes the following papers:

- “Resonant Pulsing Frequency Effect for Much Smaller Bubble Formation with Fluidic Oscillation” by Desai et al. [14];
- “Bubble Size and Bubble Concentration of a Microbubble Pump with Respect to Operating Conditions” by Jeon et al. [15];
- “Spherical Shaped (Ag–Fe<sub>3</sub>O<sub>4</sub>/H<sub>2</sub>O) Hybrid Nanofluid Flow Squeezed between Two Riga Plates with Nonlinear Thermal Radiation and Chemical Reaction Effects” by Ahmed et al. [16];
- “Numerical Study of the Magnetic Field Effect on Ferromagnetic Fluid Flow and Heat Transfer in a Square Porous Cavity” by El-Amin et al. [17];
- “Experimental Study of Particle Deposition on Surface at Different Mainstream Velocity and Temperature” by Zhang et al. [18].

There are two papers dealing with microbubbles present in the flow [14,15], a nanofluids application [16], ferromagnetic fluid behaviour [17] and a particle deposition problem [18].

The fifth grouping includes only two papers. It is referred to as “**Waste heat recovery**”. It is clearly an important and growing field in energy research, especially in the context of climate change and efficiency drives in manufacturing industries to reduce carbon emissions. The two contributions to this special issue include:

- “Development and Assessment of Two-Stage Thermoacoustic Electricity Generator” by Hamood et al. [19];

- “Investigation of the Concepts to Increase the Dew Point Temperature for Thermal Energy Recovery from Flue Gas, Using Aspen®” by Fedorova et al. [20].

Finally, the last grouping brings together “**Miscellaneous problems**”, purely on the basis that the works submitted are within relatively niche fields that include a single paper each in this special issue. The papers are devoted to fire spreading [21], pyrolysis [22], lubrication [23], water hammer effect [24] and a refined method of calculating friction losses in pipes [25].

- “Experimental Study on the Fire-Spreading Characteristics and Heat Release Rates of Burning Vehicles Using a Large-Scale Calorimeter” by Park et al. [21];
- “Macro and Meso Characteristics of In-Situ Oil Shale Pyrolysis Using Superheated Steam” by Wang et al. [22];
- “A Numerical Study on Influence of Temperature on Lubricant Film Characteristics of the Piston/Cylinder Interface in Axial Piston Pumps” by Song et al. [23]
- “Investigation on Water Hammer Control of Centrifugal Pumps in Water Supply Pipeline Systems” by Wan et al. [24];
- “One-Log Call Iterative Solution of the Colebrook Equation for Flow Friction Based on Padé Polynomials” by Praks and Brkić [25].

The guest editor and the editorial team of *Energies* hope that the readership will find the selection of articles presented here a useful contribution to the broad field of fluid flow and heat transfer in the context of energy systems.

**Conflicts of Interest:** The author declares no conflict of interest.

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