inventions

MDPI

Editorial

Heat Transfer and Its Innovative Applications

Ping-Hei Chen [1,*] and Hyung Hee Cho [2]

[1] Department of Mechanical Engineering, National Taiwan University, Taipei 106, Taiwan.
[2] Department of Mechanical Engineering, Yonsei University, Seoul 120-749, Korea; hhcho@yonsei.ac.kr
* Correspondence: phchen@ntu.edu.tw

Received: 24 December 2018; Accepted: 16 January 2019; Published: 18 January 2019

Innovative and high-end techniques have been recently developed in academic institutes and are gradually being employed in our daily lives for improving living quality, namely, artificial intelligence (AI) technology, autonomous cars, hyper-loop for high-speed transportation, miniaturization of electronic devices, heat dissipation from cooling films to outer space, and so on. Nevertheless, these innovative technologies all face thermal management problems within their key components. They cannot reach their optimal performance without appropriate heat transfer techniques for controlling the systems at required temperatures during their operation.

This Special Issue "Heat Transfer and its Innovative Applications" will provide a deep understanding of different modes of heat transfer and their innovative applications in different applications. There are eleven papers in this Special Issue and they consist of the following:

The first paper [1] accounts for the investigation of the effects of size and pitch of hydrophobic square patterns on copper test pieces in pool boiling heat transfer. This paper proposes the optimum size of square patterns and pitch for the highest heat transfer coefficient. In addition to this, the paper also investigates the effects of size and pitch of square patterns on bubble dynamics.

The second paper [2] presents the optimization of a rectangular fin placed within a mixed convective square confined space filled with Al_2O_3–water nanofluid by means of constructal design. This paper also examines mixed convection for different values of Rayleigh and Reynolds numbers for various fin geometries, which can be used for cooling gas-turbine components and electronic chips.

The third paper [3] shows an experimental study of organic Rankine cycle (ORC) with n-hexane as the working fluid and a radial turbine expander. In this paper thorough understandings of the relationship between turbine efficiency and turbine inlet parameters are provided. This paper proposes that ORC with n-hexane can be used in low-temperature waste heat recovery systems to produce power.

The fourth paper [4] elaborates on the optimal designing of the micro channel heat sink by combing the finite element method with the genetic algorithm. Design objectives include the minimization of the thermal resistance and weight of the micro channel heat sink. This paper proposes the optimum weight reduction of the micro channel heat sink individually or simultaneously.

The fifth paper [5] describes the optimization of an oven utilizing radiative heat transfer as the single heat mechanism for smart phone panels. Optimization using full-factorial experiments to identify the main effects from each factor such as space configuration of the heating lamps and the relative distance between lamps and the panel is proposed. The results of optimization give systematic ideas about developing a thermal radiation oven.

The sixth paper [6] compares the new phase transition water heater and an existing one based on efficiency. The proposed phase transition medium shows low sensitivity of heat source and gas flow fluctuation. This paper also presents an economic analysis to forecast the economic efficiency of phase transition water heaters.

The seventh paper [7] involves investigation of interfacial droplet jetting characteristics and thermal stability of a focused surface acoustic wave (F-SAW) device. In addition, the paper also

provides insights into the designing of an F-SAW device. Thermal evaluation of SAW devices was done with respect to variables such as operating environment and fluid type.

The eighth paper [8] presents the effect of anodic aluminum oxide (AAO) on the heat transfer performance of gravity heat pipes. Parameters such as temperature distribution, overall thermal resistance, and dry-out occurrence of gravity heat pipes charged with acetone under different input heat powers were investigated by using a thermal performance test system. This paper also provides insights into the influence of inner surface morphology of gravity heat pipes on heat transfer performance.

The ninth paper [9] discusses the experimentally examined hydro-thermal characteristics of a twin-pass parallelogram channel enhanced by detached S-ribs. This paper also presents the empirical correlations evaluating the regionally averaged Nusselt numbers and Fanning friction factors for the twin-pass parallelogram channel with detached S-ribs.

The tenth paper [10] investigates the effects of oscillations in the main flow and coolant jets on film cooling at various frequencies at low and high average blowing ratios. This paper provides a deeper understanding of different regimes of film cooling effectiveness based on multi-frequency inlet velocities. Numerical Simulations were done to indicate the effects of oscillating flows when designing film cooling systems for gas turbines.

The last but not least paper [11] presents an Ansys Fluent code numerical investigation of metal foam effects in a latent heat thermal energy storage system based on a phase change material with nano-phase-change-material (nano-PCM). This paper proposes the enthalpy-porosity theory for simulating the phase change of the nano-PCM, and the metal foam is modeled as a porous media.

Conflicts of Interest: The authors declare no conflict of interest.

References

1. Sujith Kumar, C.S.; Chang, Y.W.; Arenales, M.R.M.; Kuo, L.-S.; Chuang, Y.H.; Chen, P.-H. Experimental Investigation on the Effect of Size and Pitch of Hydrophobic Square Patterns on the Pool Boiling Heat Transfer Performance of Cylindrical Copper Surface. *Inventions* **2018**, *3*, 15.
2. Cong, R.; Ozaki, Y.; Machado, B.S.; Das, P.K. Constructal Design of a Rectangular Fin in a Mixed Convective Confined Environment. *Inventions* **2018**, *3*, 27. [CrossRef]
3. Pethurajan, V.; Sivan, S. Experimental Study of an Organic Rankine Cycle Using n-Hexane as the Working Fluid and a Radial Turbine Expander. *Inventions* **2018**, *3*, 31. [CrossRef]
4. Lin, D.T.W.; Kang, C.-H.; Chen, S.-C. Optimization of the Micro Channel Heat Sink by Combing Genetic Algorithm with the Finite Element Method. *Inventions* **2018**, *3*, 32. [CrossRef]
5. Gu, M.-J.; Yang, S.; Wu, Y.-C.; Chiu, C.-J.; Chen, Y.-B. Designing a Thermal Radiation Oven for Smart Phone Panels. *Inventions* **2018**, *3*, 36. [CrossRef]
6. Tan, Z.; Yao, Y.; Yao, C.; Yang, J.; Ruan, Y.; Wang, Q. A New Phase Transition Heat Exchanger for Gas Water Heaters. *Inventions* **2018**, *3*, 37. [CrossRef]
7. Lee, D.; Lee, N.; Choi, G.; Cho, H.H. Heat Transfer Characteristics of a Focused Surface Acoustic Wave (F-SAW) Device for Interfacial Droplet Jetting. *Inventions* **2018**, *3*, 38. [CrossRef]
8. Weng, H.C.; Yang, M.-H. Heat Transfer Performance Enhancement of Gravity Heat Pipes by Growing AAO Nanotubes on Inner Wall Surface. *Inventions* **2018**, *3*, 42. [CrossRef]
9. Chang, S.W.; Cai, W.-L.; Wu, R.-J. Heat Transfer Enhancement by Detached S-Ribs for Twin-Pass Parallelogram Channel. *Inventions* **2018**, *3*, 50. [CrossRef]
10. Baek, S.I.; Yavuzkurt, S. Effects of Flow Oscillations in the Mainstream on Film Cooling. *Inventions* **2018**, *3*, 73. [CrossRef]
11. Buonomo, B.; di Pasqua, A.; Ercole, D.; Manca, O. Numerical Study of Latent Heat Thermal Energy Storage Enhancement by Nano-PCM in Aluminum Foam. *Inventions* **2018**, *3*, 76. [CrossRef]