

Title Fluid Flow and Convection Heat Transfer in Energy and Power Engineering Applications

Speaker Prof. Peixue Jiang
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Place I²CNER hall, I²CNER Bldg.1, Ito Campus, Kyushu University

Abstract

This presentation will describe some background of convection heat transfer and two-phase flow in clean energy and power technology, and our investigations on convection heat transfer of fluids at super-critical pressures in tubes or porous structures in clean energy, two-phase flow in climate change, and heat transfer in space power technology. Super-critical pressures fluids are more and more used in thermal power equipments, advanced nuclear reactors, aerospace, solar-thermal power stations, EOR, CO₂ aquifer sequestration and enhanced geothermal system (EGS). The knowledge on convection heat transfer of fluids at super-critical pressures is essential for the development of the technologies. This speech will introduce convection heat transfer of fluids at super-critical pressures in straight small/mini/micro tubes, serpentine tube, fractures and porous media, and two-phase flow in porous media. Transpiration cooling is an effective way to protect high heat flux walls. Transpiration cooling has been widely investigated to protect the leading edges of hypersonic vehicles, combustion chamber walls, struts in scramjet engines and other high heat flux components in spacecraft. This study presents advances of transpiration cooling, which includes transpiration cooling in supersonic mainstream, combined transpiration and film cooling, combined transpiration and opposing jet cooling, transpiration cooling with phase change, self-pumping transpiration cooling and transpiration cooling with additive manufactured porous material. The influences of injection ratio, porous material and shock wave on transpiration cooling in the supersonic mainstream were numerically and experimentally investigated.

About the Speaker

1986	Bachelor of Engineering, Tsinghua University
1991	Ph.D., Moscow Power Engineering Institute
1997-present	Professor, Tsinghua University

Professor Jiang is now the Director of Institute of Engineering Thermophysics in Department of Energy and Power Engineering, Director of Key Laboratory for Thermal Science and Power Engineering of Ministry of Education, Director of Beijing Key Laboratory of CO₂ Utilization and Reduction Technology. He is a council member of the Chinese society of engineering thermophysics, vice chairman of the Chinese heat and mass transfer society, member of department of energy and transportation in science and technology committee of the Ministry of Education, member of the Technical Expert Group on Renewable Energy and Hydrogen Energy of the 13th Five-Year Plan of China. He is an Honorary Professor of University of Nottingham (UK), Honorary Professor of Moscow Power Engineering Institute (Russia), and visiting Professor of University of Sheffield (UK).

Host: Professor Yasuyuki Takata

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