

REVVING UP NUCLEAR POWER THROUGH INNOVATIVE COMPACT HEAT EXCHANGERS

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Abstract:

The primary mission of advanced nuclear reactors is to generate electricity and provide high-temperature process heat for industrial applications with high efficiency, which greatly relies on an effective intermediate heat exchanger (IHX) that transfers heat from the primary fluid to a secondary fluid. A high-temperature diffusion-bonded compact heat exchanger, or printed circuit heat exchanger (PCHE), is one of the leading IHX candidates to be employed in advanced reactors due to its compactness and capability for high-temperature, high-pressure applications with high effectiveness.

In this talk, we will discuss design, fabrication, experimental testing, and numerical modeling of PCHEs for advanced reactor applications. This study provides critical insights into the thermal-hydraulic performance of PCHEs that can be applied to nuclear power, concentrated solar power, and industrial sectors. This talk will also cover some of Dr. Chen's future research directions on high-temperature innovative compact heat exchangers and molten salt thermal hydraulics.

Bio:

Dr. Minghui Chen was a research fellow in the Department of Nuclear Engineering and Radiological Sciences at the University of Michigan – Ann Arbor. Dr. Chen earned his B.S. degree in Nuclear Engineering from Harbin Engineering University in China in 2011, his M.S. degree in Nuclear Engineering from The Ohio State University in 2015, and Ph.D. degree in Nuclear Engineering from the University of Michigan – Ann Arbor in 2018. Dr. Chen's research mainly focuses on experimental thermal hydraulics including separate and integral effects tests. In particular, he designs and executes experiments to investigate the performance of high-temperature components for Fluoride-salt-cooled High-temperature Reactors (FHRs) and Very-High-Temperature Reactors and to demonstrate the reliability of passive heat removal systems for FHRs. He has published nine peer-reviewed journal publications, seven refereed conference papers, and nine summaries.