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Editorial: Experimental and simulation research on nuclear reactor thermal-hydraulics

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Editorial on the Research Topic

Experimental and simulation research on nuclear reactor thermal-hydraulics

The researches on nuclear reactor thermal-hydraulics have achieved outstanding progresses in the past decades. In recent years, basic research on multiphase flow dynamics and corresponding measurement technology, as well as preliminary research on Gen IV reactors based on experiments and simulations are attracting more and more attention. However, the inside complicated physics and outside extreme conditions will also bring risks and challenges to the development of nuclear industry.

Prof. Liangming Pan from Chongqing University held the first annual academic meeting of the branch of Nuclear Reactor Thermal-Hydraulics and Fluid Mechanics of Chinese Nuclear Society in October 2021. Several high-quality papers were selected from this conference. Therefore, Prof. Pan proposed the Research Topic “*Experimental and Simulation Research on Nuclear Reactor Thermal-Hydraulics*” in the journal *Frontiers in Energy Research*. This research topic aims to promote the novel experimental and numerical investigations on relevant issues refer to nuclear reactor thermal-hydraulics, which is of great significance to the system optimization and safety evaluation of nuclear power plants. Finally, 14 articles were collected and published in this topic, covering the experimental and numerical research of thermal hydraulic problems in light water reactors to supercritical coolant reactors.

Most papers are relevant to the thermal hydraulic problems in light water reactors. [Li et al.](#) have contributed an article: “*Research on Countercurrent Flow Limitation in Reactor Hot Leg at the Loss of Coolant Accident-Thermal hydraulic Calculation with System Code RELAP5*”. [Meng et al.](#) have presented an article entitled: “*Research of Thermal Hydraulic Conditions Effect on PWR CIPS Risk*”. [Yu et al.](#) have presented an article: “*An Innovative Investigation on Fluid-to-Fluid Modeling of Post-Dryout Heat Transfer in Thermal Energy Systems*”. [Zhu et al.](#) have contributed an article: “*Comparison of Intergroup Mass Transfer Coefficient Correlations in Two-Group IATE for Subcooled Boiling Flow*”. [Ding et al.](#) have

contributed their research relevant to: “*Experimental Research of Flow Distribution at Reactor Core Inlet of ACP100*”. Li et al. have presented article in title of “*Experimental Study on Stratification Morphology of the Molten Pool during Severe Accident*”.

Several research papers are about the supercritical coolant. Zhang et al. have contributed an article: “*Experimental Study on Prototype of Printed Circuit Heat Exchanger*”. Zhu et al. have presented an article entitled: “*Dynamic Characteristic Study of Supercritical CO₂ Recompression Brayton Cycle System*”. Min et al. have presented their research article of: “*Study of Supercritical CO₂ Physical Property Calculation Models*”.

Several articles are related to the high temperature gas-cooled reactor. Qin et al. have presented an article entitled: “*Numerical Investigation of Hot Helium Flow Homogenizer on Inter-Unit Flow Rate Uniformity of HTGR Once through Steam Generator*”. Qu et al. have contributed an article: “*Characteristics Analysis of Combined Cycle Coupled With High Temperature Gas-Cooled Reactor Based on Progressive Optimization*”.

Meanwhile, there are several articles about other issues. Wang et al. have contributed the research paper of: “*Neutronics and Thermal Hydraulics Coupling Analysis on Novel Organic Cooled Reactor Based on Single-Channel Model*”. Fang et al. have contributed an article: “*Numerical Study on Heat Transfer and Enhancement Mechanism in PCM-Filled Shell-and-Tube Heat Exchangers*”. Su et al. have contributed an article entitled: “*Development and Assessment of an Isotropic Four-Equation Model for Heat Transfer of Low Prandtl Number Fluids*”.

Through revision and update for almost 1 year, this topic finally closed with above 14 papers published in the journal

Frontiers in Energy Research. This topic presents a chance to public to follow these high-quality papers selected from this conference. The journal *Frontiers in Energy Research* will always open to accept more papers from international conferences. All the editors are welcomed to contact the journal for further information.

Author contributions

LZ is the leading author. LP is the corresponding author. JW and WD contribute the review. All authors approved the submitted version.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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