Department of Mechanical Engineering Seminar

2PM, 7/10/2023 Monday

Steinman Hall Room 254 (Conference Room)

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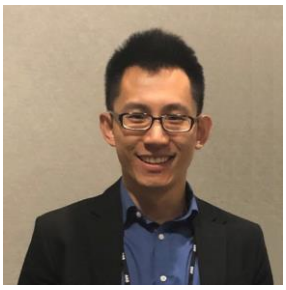

On the Advanced Nuclear System Development and Reactor Safety Analysis

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ABSTRACT

Nuclear science and technology benefit human society in many ways. The nuclear power plants contribute to about 20% of the electricity generated in the United States in the past 10 years. While the existing light-water reactors have demonstrated their stability over decades of commercial operation, the next-generation reactors (i.e., Gen IV reactors) that employ different coolants (e.g., liquid-metal, molten-salt, helium) can make nuclear power safer and more economically competitive. To assist in the development of Gen IV reactors, a testing capability in a fast neutron environment is essential and several projects are established to address this need. These include the development of a sodium cartridge loop for Versatile Test Reactor (VTR) and the development of a novel fast/thermal hybrid nuclear system using lead-bismuth-eutectic as coolant. On the other hand, some of the radioisotopes, produced from nuclear reactions, are widely used in disease diagnostic procedures, medical imaging, and cancer treatments. This talk will also discuss the development of nuclear systems driven by accelerators to provide commercial scale radioisotopes for medical purposes (e.g., Mo-99 and Ac-225). One unique feature differentiating nuclear systems from other systems is the radioactive materials contained. To prevent the release of radioactive materials into the environment in any accidental scenarios, reactor safety analysis is of great importance. Efforts are made to improve the safety analysis of nuclear systems through improved modeling of gas-liquid two-phase flows in different flow orientations, and jet impingement in postulated pipe rupture accidents.

BIO

Dr. Ran Kong earned his Ph.D. degree in nuclear engineering from Purdue University, after which he continued his postdoc training in the same research laboratory for about three years. His research focuses on various topics in nuclear thermal-hydraulic experiments and simulations, including gas-liquid two-phase flow, liquid metal flow, advanced nuclear system design, reactor safety analysis, safety analysis code development, flow instrumentation development. His work has established the technical basis to support the design, licensing, and operation of various nuclear engineering systems.