Special Issue

Flow and Heat Transfer in Gas-Cooled Nuclear Reactors

Message from the Guest Editor

Dear Colleague, Gas-cooled reactors have promising applications in electricity generation, cogeneration, and industrial process heat. Two of six Gen IV nuclear systems candidates are gas-cooled reactors, i.e., very high-temperature reactors and gas-cooled fast reactors. Smaller-scale gas-cooled reactors can be deployed in remote areas or in space as electricity or power suppliers. Gas flow and heat transfer are fundamental to the thermal hydraulic design and safety analysis of gas-cooled reactors. New gas coolants, such as helium–xenon mixtures and supercritical carbon dioxide, need to be investigated for their thermal properties, as do turbulence models in novel gas-cooled nuclear systems. The complex geometries of reactor cores make it difficult to identify flow and heat transfer features. High-temperature operation conditions highlight the effect of thermal radiation, combined with conduction and convection, in gas flow and heat transfer. A deeper understanding of gas flow and heat transfer is necessary in order to promote gas-cooled nuclear reactors among designers, regulators, and investors.

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