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Current Thermal Hydraulic Activities on Sodium-cooled Fast Reactors in Japan

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The safety design criteria (SDC) has been established in the framework of the Generation-IV International Forum by incorporating safety-related R&D results on innovative technologies and lessons-learned from Fukushima Dai-ichi nuclear power plants accident in order to provide the set of general criteria for the safety designs of structures, systems and components of Generation-IV sodium-cooled fast reactors. To meet the concept of the criteria, several design studies and related researches are carried out for the development of Japan sodium-cooled fast reactor, which should ensure high levels of safety and reliability along with achieving economic competitiveness with future contemporary light water reactors. In this paper, the authors focus on the thermal hydraulic issues related to the SDC, e.g., natural circulation decay heat removal, thermal stripping, sodium combustion, and sodium-water chemical reaction. Progress of quantitative evaluation methods on these issues are reviewed along with activities on validation studies.

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