

A Comparison of Core Perturbation by Coolant Loss between Sodium and Lead-Bismuth Cooled Reactor

Yong Nam Kim and Jong Kyung Kim
Hanyang University
17 Haengdang, Sungdong
Seoul 133-791, Korea

Won Seok Park
Korea Atomic Energy Research Institute
150 Dukjin, Yusong
Taejon 305-353, Korea

Abstract

This study performs a comparative analysis of the core perturbation caused by coolant loss between sodium and lead-bismuth eutectic. Considering the Zr-based and the U-based fuel in a 1,000MWth class reactor for TRU incineration, we investigate which coolant shows better performance for negative coolant loss reactivity in each case of fuel type. The calculation results show that in the case of U-based fuel, sodium gives rise to more positive coolant loss reactivity than lead-bismuth. However, when the Zr-based (U-free) fuel is considered, sodium offers negative coolant loss reactivity, whereas lead-bismuth makes the coolant loss reactivity positive. It is recommended to employ sodium coolant for the fertile-free fueled core and lead-bismuth for the core with fertile nuclides.