

A Study on Natural Circulation of Primary Pb-Bi Coolant and Decay Heat Removal System for ENHS

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ABSTRACT

The feasibility study has been carried out for verifying the feasibility of the ENHS (Encapsulated Nuclear Heat Source) concept with 100% - natural circulation of primary Pb-Bi coolant. However, the heat transfer characteristics of Pb-Bi heavy liquid metal were not quantified. This problem leads to the uncertainty of accuracy of the ENHS module scale and layout. In addition, the most accident scenarios were not simulated through the detailed analysis code.

Therefore, this paper presents the heat transfer characteristics of Pb-Bi coolant and the optimized ENHS design. The other is decay heat removal system, which is proper to Pb-Bi eutectic pool of ENHS secondary system, which is simulated through the detailed code - DSNP (Dynamic Simulator for Nuclear Power Plant). In addition, as the validation of the ENHS stability, the LOHS (Loss of Heat Sink) and reactivity insertion are simulated through the DSNP code. Results illustrate that the performance of the ENHS module is reasonable.

Thermal Hydraulic and Structural Analysis of Liquid Metal Target and Window

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ABSTRACT

A subcritical transmutation reactor research is in progress for treatment of spent fuel. The subcritical transmutation reactor needs target system to produce high-energy neutrons. In target system, beam window is subject to high thermal field, because it interacts with high energy proton beam. In this study, thermal-hydraulic analysis was performed to design target which cools down window effectively. Then, thermal and structural analysis of window was performed to find out dominant parameters on window structural safety and to establish base parameter values of target.