

Effect of Modeling of Hydraulic Form Loss Coefficient to Break on Emergency Core Coolant Bypass

Authors : Young S. Bang, Dong H. Yoon, Seung H. Yoo

Abstract : Emergency Core Coolant Bypass (ECC Bypass) has been regarded as an important phenomenon to peak cladding temperature of large-break loss-of-coolant-accidents (LBLOCA) in nuclear power plants (NPP). A modeling scheme to address the ECC Bypass phenomena and the calculation of LBLOCA using that scheme are discussed in the present paper. A hydraulic form loss coefficient (HFLC) from the reactor vessel downcomer to the broken cold leg is predicted by the computational fluid dynamics (CFD) code with a variation of the void fraction incoming from the downcomer. The maximum, mean, and minimum values of FLC are derived from the CFD results and are incorporated into the LBLOCA calculation using a system thermal-hydraulic code, MARS-KS. As a relevant parameter addressing the ECC Bypass phenomena, the FLC to the break and its range are proposed.

Keywords : CFD analysis, ECC bypass, hydraulic form loss coefficient, system thermal-hydraulic code

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