

A Proposed Methodology for Assessment of External Vessel Cooling During Severe Accidents in Pressurized Water Reactors

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Abstract

In this paper, a consistent probabilistic approach is proposed to evaluate the feasibility of in-vessel retention of the molten corium through external vessel cooling (IVR-EVC) during severe accidents of pressurized water reactors (PWRs). By combining the results of Level-1 probabilistic safety assessment, a critical heat flux correlation, and the wall heat flux distribution calculated by a severe accident code, we can reasonably predict the overall success probability of the IVR-EVC for severe accidents of a PWR from the viewpoint of thermal failure criteria. Various considerations in applying the proposed procedure to the Korean Next Generation Reactor (KNGR) and future developmental needs are also discussed in this paper.

Key Words: in-vessel retention (IVR), external vessel cooling (EVC), severe accident, Korean Next Generation Reactor (KNGR)