

Assessment of RELAP5/MOD3.2.2 γ Against Flooding Database in Horizontal-to-Inclined Pipes

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Abstract

A total of 356 experimental data for the onset of flooding are compiled for the data bank and used for the assessment of RELAP5/MOD3.2.2 γ predictions of Counter-Current Flow Limitation (CCFL) in horizontal-to-inclined pipes simulating a PWR hot leg.

The predictions of the flooding gas velocity in the database are known to be largely dependent on the horizontal pipe length-to-diameter ratio (L/D). RELAP5 calculations are compared with the experimental data where L/D is varied within the range of database. The present input model used for the simulation of CCFL is validated to reasonably calculate the gradient of water level in the horizontal pipes connected with the inclined volumes.

RELAP5 calculations show that the RELAP5 predicts the flooding points qualitatively well but higher gas flow rate is required to initiate the flooding compared with the experimental data if the L/D is as low as that of the hot legs of typical PWRs.

Standard RELAP5 code is modified to apply the user specified CCFL curve not only to vertical volumes but also to the horizontal volumes. The calculation value by the modified version lies well on the applied CCFL curve even if flooding occurs at lower gas velocity than predicted by the CCFL curve in standard RELAP5.