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Computational Fluid Dynamics Analysis of Natural Circulation Flows in a Pressurized-Water Reactor Loop Under Severe Accident Conditions (Paperback)

By U S Nuclear Regulatory Commission

Createspace Independent Publishing Platform, United States, 2014. Paperback. Condition: New. Language: English . Brand New Book ***** Print on Demand *****. Computational fluid dynamics is used to predict the natural circulation flows between a simplified reactor vessel and the steam generator of a pressurized-water reactor (PWR) during a severe accident scenario. The results extend earlier predictions of steam generator inlet plenum mixing with the inclusion of the entire natural circulation loop between the reactor vessel upper plenum and the steam generator. Tube leakage and mass flow into the pressurizer surge line are also considered. The predictions are utilized as a numerical experiment to improve the basis for simplified models applied in one-dimensional system codes that are used during the prediction of severe accident natural circulation flows. An updated inlet plenum mixing model is proposed that accounts for mixing in the hot leg too. The new model is consistent with the predicted behavior and accounts for flow into a side mounted surge line if present. A density- based Froude number correlation is utilized to provide a method for determining the flow rate from the vessel to the hot leg directly from the conditions at the ends of the hot leg pipe....



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