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ANALYSIS OF THE INTERFACIAL AREA TRANSPORT MODEL FOR INDUSTRIAL 2-PHASE BOILING FLOW APPLICATIONS

One of the most important parameters when using a 2-fluid model to analyze the critical heat flux (CHF) performance of a mixing grid is the interfacial area term. This term is responsible for the rate of phase change and the amount of thermal
and mechanical interaction between phases. Accurate closure relations for this term are not fully developed for flow conditions in a rod bundle that contain spacers with mixing vanes and simple support grids. Using the OECD/NRC,
Nuclear Power Engineering Corporation (NUPEC) PWR Bundle Tests (PSBT) 5x5 rod bundle steady-state average void fractions are compared to numerical simulations. Predicting the correct void fraction is one aspect in using numerical
simulation to predict CHF performance but attention must also be turned to the temperature distribution along the rods, especially the impact of spacers. An analysis is presented which shows the impact of the temperature distribution
along the rods for various interfacial area transport model parameters and closure models. With this AREVA demonstrates that it is possible to predict average void and correct temperature distributions with the use of computational fluid
dynamics (CFD).

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