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Advances in Computational Fluid Dynamics Modeling of Two Phase Flow in a Boiling Water Reactor Fuel Assembly

Anew code, CFD-BWR , is being developed for the simulationof two-phase flow phenomena inside a BWR fuel bundle. Thesephenomena include coolant phase changes and multiple flow regimes whichdirectly influence the coolant interaction with fuel assembly and, ultimately,the reactor performance. CFD-BWR is a specialized module built onthe foundation of the commercial CFD code STAR-CD whichprovides general two-phase flow modeling capabilities. New models describing theinter-phase mass, momentum, and energy transfer phenomena specific for BWRshave been developed and implemented in the CFD-BWR module. Aset of experiments focused on two-phase flow and phase-change phenomenahas been identified for the validation of the CFD-BWR codeand results of two experiment analyses focused on the radialvoid distribution are presented. The close agreement between the computedresults, the measured data and the correlation results provides confidencein the accuracy of the models.

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