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Advances in the development and validation of CFD-BWR , a Two-Phase Computational Fluid Dynamics model for the simulation of flow and heat transfer in Boiling Water Reactors



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Abstract:

This paper presents an overview of the model development and validation of an advanced Computational Fluid Dynamics (CFD) computer code (CFD-BWR) that allows the detailed analysis of two-phase flow and heat transfer phenomena in Boiling Water Reactor (BWR) fuel bundles. The CFD-BWR code is being developed as a customized module built on the foundation of the commercial CFD-code STAR-CD which provides general two-phase flow modeling capabilities. The model development strategy that has been adopted by the development team for the prediction of boiling flow regimes in a BWR fuel bundle includes the use of local flow topology maps and topology-specific phenomenological models specifically designed for a 3-dimensional CFD code. The paper reviews the key boiling phenomenological models and focuses on several key experiment analyses for the validation of two-phase BWR phenomena models including flow regime experiments, cladding-to-coolant heat transfer and

Critical Heat Flux experiments, and the BWR Full-size Assembly Boiling Test (BFBT).

 [2010-CFD4NRS3-Tentner.pdf](#)^[2]

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