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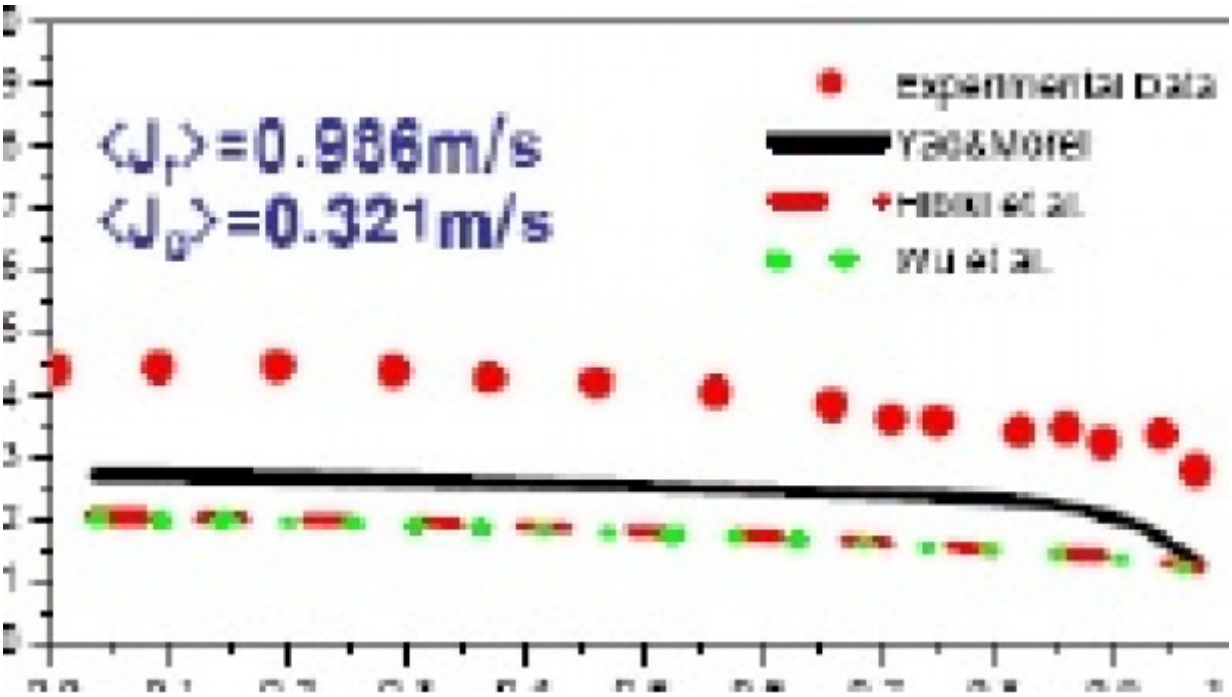
Evaluation of One-Group Interfacial Area Transport Equation for the Air/water Flow Condition with CFD Code



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Abstract:

Most of the CFD (Computational Fluid Dynamics) and nuclear thermal hydraulic analysis codes adopt Eulerian multiphase flow approach based on the two-fluid model for the prediction of two phase flows. In these codes, instantaneous time averaged equations for the conservation of mass, momentum and energy are solved for each phase. However, constitutive models for interfacial transfer terms are required to make a link between the two governing equations for two phases. The interfacial transfer terms are directly proportional to the interfacial area concentration (IAC) and thus it is a prime important parameter to be provided. Ishii (1990) proposed at first a practical concept of IATE (interfacial areaconcentration transport equation) for the mechanistic prediction of the IAC. Later, many investigators also proposed one- or two- group IATE for the one dimensional thermal hydraulic and CFD codes. In the present work, available one-group IATE models were evaluated against air/water data for the application in the CFD codes.

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