A Dual-Time Preconditioning Method for Unsteady Two-Phase Flows

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Abstract: A preconditioning numerical method for gas-liquid two-phase flow is presented. The numerical resolution is based on finite difference method with artificial compressibility algorithm. The dual-time integration procedure is used to obtain the unsteady solution. The numerical model is based on the solution of Reynolds-averaged Navier-Stokes equations for the mixture of liquid and vapor in the body-fitted curvilinear coordinate system. The method is applied to simulate cavitating flows. The mass transfer due to cavitation is modeled as source and sink terms in liquid and vapor continuity equations. By this method, steady non-cavitating and cavitating flows around the hemispherical head of a cylindrical object, unsteady cavitating flow in a venturi-type duct are computed. Comparison of predicted results with experimental observations are provided and discussed.

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