Explicit Discontinuity-Capturing Methods for Two-Phase Inviscid Compressible Flows

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Abstract

The explicit nonlinear filtering is applied to the quasi-conservative five-equation model of two-phase compressible flows to capture the interface between each fluid. The capability of the filtering in capturing the contact discontinuity and damping the grid-to-grid oscillations is analysed. Two test cases are performed, namely the one-dimensional (1D) gas-liquid Riemann problem and the 1D shock-interface interaction. The numerical results reveal that the present filtering method can accurately capture the propagation of the shock waves and interfaces. Additionally, it produces less spurious oscillations compared with the previous discontinuity-capturing filter.

Keywords: Compressible two-phase flows, Euler's equation, Explicit nonlinear filtering,
Numerical oscillations, Direct numerical simulation