

Abstract Submitted
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Two-Phase Open/Outflow Boundary Conditions¹ SUCHUAN DONG, Purdue University — Two-phase outflows refer to two-phase flow situations where the interface between two immiscible incompressible fluids passes through open portions of the domain boundary. They are widely encountered in two-phase problems involving physically unbounded domains or inflow/outflow boundaries. We present an effective outflow boundary condition, and an associated numerical algorithm, within the phase field framework for dealing with two-phase outflows or open boundaries. The set of two-phase outflow boundary conditions are devised to ensure the energy stability of the two-phase system. They are therefore effective even in situations where strong backflows or vortices are present at the two-phase outflow boundaries. Numerical simulations involving two-phase inflows/outflows are discussed to demonstrate the effectiveness of the present method when large density ratios and large viscosity ratios are involved and when strong backflows are present at the two-phase outflow boundaries. The method can potentially enable new investigations into the long-time behaviors and statistical features of two-phase systems involving outflow/inflow boundaries.

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