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Gradient Augmented Level Set Method for Two Phase Flow Simulations with Phase Change C.R. LAKSHMAN ANUMOLU, MARIO F. TRUJILLO, University of Wisconsin-Madison — A sharp interface capturing approach is presented for two-phase flow simulations with phase change. The Gradient Augmented Levelset method is coupled with the two-phase momentum and energy equations to advect the liquid-gas interface and predict heat transfer with phase change. The Ghost Fluid Method (GFM) is adopted for velocity to discretize the advection and diffusion terms in the interfacial region. Furthermore, the GFM is employed to treat the discontinuity in the stress tensor, velocity, and temperature gradient yielding an accurate treatment in handling jump conditions. Thermal convection and diffusion terms are approximated by explicitly identifying the interface location, resulting in a sharp treatment for the energy solution. This sharp treatment is extended to estimate the interfacial mass transfer rate. At the computational cell, a d-cubic Hermite interpolating polynomial is employed to describe the interface location, which is locally fourth-order accurate. This extent of subgrid level description provides an accurate methodology for treating various interfacial processes with a high degree of sharpness. The ability to predict the interface and temperature evolutions accurately is illustrated by comparing numerical results with existing 1D to 3D analytical solutions.

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