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Multicomponent Near-critical Flow Simulations: Reducing Spurious Pressure Oscillations BRADLEY BOYD, DORRIN JARRAHBASHI, Texas A and M University — Spurious pressure oscillations are the most common numerical instabilities observed in multiphase and multicomponent flow problems near the critical point. A diffuse-interface model is developed to simulate transcritical mixing in multispecies and multiphase systems where spurious pressure oscillations are problematic. To reduce the spurious pressure oscillations, three methods have been proposed and implemented: (1) artificially thickening the interface between different species, (2) reconstruction of the primitive variables in the characteristics space, and (3) developing a hybrid method that switches between quasi-conservative double-flux and the classical fully-conservative numerical procedures based on the changes in the effective specific heat ratio and the effective reference internal energy. Characteristic-wise reconstruction tends to reduce the spurious pressure oscillations compared to primitive-wise reconstruction. The hybrid model is found to effectively reduce the magnitude of the spurious pressure oscillations, the loss of energy conservation, and provides more accurate results for all tested cases.

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