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Approach for robustly simulating supercritical fluid mixing with large density contrast using high-order schemes HIROSHI TERASHIMA, MITSUO KOSHI, The University of Tokyo — We present a robust yet efficient approach for simulating supercritical fluid mixing with large density contrast using a high-order central differencing scheme. The present method is designed to maintain the pressure and velocity equilibriums at fluid interfaces for any type of discretization and equation of state: the pressure evolution equation is introduced for the pressure equilibrium and the numerical diffusion terms for the mass and momentum equations are consistently constructed for the velocity equilibrium. Thus, spurious oscillations possibly generated at interfaces are prevented, enabling robust applications of high-order schemes to severe thermodynamic fluid conditions. The consistent numerical diffusion term is also constructed for the species-mass conservation equation. Several examples of supercritical fluid problems such as interface advection and jet mixing problems demonstrate the robustness and superiority of the present method over a conventional conservative method.

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