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**A stabilized coupled level set and volume of fluid method for incompressible two-phase flow at high Reynolds number and high density ratio** HAN LIU, Department of Mechanical Engineering & St. Anthony Falls Laboratory University of Minnesota, QIANG GAO, Department of Mechanical Engineering University of Minnesota, LIAN SHEN, Department of Mechanical Engineering & St. Anthony Falls Laboratory University of Minnesota — When coupled level set and volume of fluid (CLSVOF) method is used coupling with non-conservative schemes, it can suffer from instability issue when the Reynolds number or the density ratio is high. We present an improved CLSVOF method that is able to simulate two-phase flows at very high Reynolds numbers and large density ratios on Cartesian grid while having high accuracy for turbulent flow resolution. To reduce the error near the two-phase interface, a consistent treatment of mass and momentum transport in the conservative form of discrete equations is employed to solve the nonlinear inertial terms of the Navier-Stokes equations. To resolve the discontinuous momentum across the two-phase interface without oscillation while keeping the accuracy of the numerical solution, a WENO scheme is used for the reconstruction of both velocity and density. The accuracy and robustness of this method are validated by benchmark tests. Quantitative comparisons have been made to show the capability of the method handling realistic two-phase flow problems at high Reynolds numbers and high density ratios.

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