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AFiD-MF: an efficient solver for three-dimensional multiphase flows HAORAN LIU, QI WANG, KAI LEONG CHONG, Univ of Twente, ROBERTO VERZICCO, Univ of Rome, DETLEF LOHSE, Univ of Twente — We propose an extension of our code AFiD (www.afid.eu) to simulate efficiently three-dimensional multiphase flows. In this approach, we implement the phase field model into AFiD in order to retain the massive solver for the incompressible Navier-Stokes equations. The performance of AFiD has been confirmed in many previous studies. To simulate the dynamics of multiphase flows, we rely on the phase field model to capture the fluid-fluid interface and deal with large density/viscosity ratios of the phases. The coupling of the phase field model with the AFiD solver is obtained by the volume fraction distribution of each phase and the surface tension force on the fluid-fluid interface. Our new approach, AFiD-MF, is validated by comparisons with data in the literature and verified through several numerical experiments, such as an oscillating droplet, the deformation of a drop in shear flow, the breakup of a rising bubble and the Rayleigh-Bnard flow with two immiscible phases.

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