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A moving mesh interface tracking method for multiphase flows with topological changes SHAOPING QUAN, JING LOU, Institute of High Performance Computing, Singapore — A moving mesh interface tracking (MMIT) method with local mesh adaptations on tetrahedral elements was developed to simulate incompressible, immiscible multiphase flows with large deformation and topological changes. The interface is represented by triangle elements, and moves with the fluid velocity. The boundary conditions across the interface are implemented directly without any smoothing of the fluids' properties as the interface is zero thickness. Mesh adaptations including smoothing, coarsening and refining are applied locally to achieve computing efficiency as well as to maintain good mesh quality. In order to handle the challenges such as interface breakup and merging, mesh separation and mesh combination are employed. These two schemes are based on the conversion of elements in one liquid phase to anther fluid by changing the fluid properties of the cells in the separation or combination region. The newly created interface is usually ragged, so a local projection method is applied to smooth the interface. Simulations of droplet oscillations and droplet-pair collisions show that the method is accurate in simulating two-phase flow, and that the method has the potential to perform detailed investigations of liquid particles breakup and coalescence.

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