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Lattice Boltzmann Method for Two-phase Flows on Unstructured Mesh[1] TAEHUN LEE, LINA BAROUDI, City College of City University of New York, KENT WARDLE, Argonne National Laboratory — A lattice Boltzmann method with Galerkin finite element discretization (FE-LBM) is proposed to simulate incompressible two-phase flows on unstructured mesh. Two-distribution functions are used to recover the transport equations for the order parameter, pressure, and momentum. Consistent treatment of streaming and intermolecular forcing terms in FE-LBM enables us to use small equilibrium interface thickness compared with the existing two-phase LBMs and thus to achieve numerical stability at higher Reynolds number and large material property contrast. Several benchmark test cases with non-trivial wall boundaries will be presented, which include turbulent free surface flow inside a concentric rotating cylinder, drop impact on patterned surfaces, and bubbly flows.

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