Modeling and simulation of multiphase incompressible flows using an energetic variational phase field model

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Abstract

I shall present an energetic variational phase field model for the mixture of two incompressible fluids which leads to a set of coupled nonlinear system consisting a phase equation and the Navier-Stokes equations. I shall discuss efficient and accurate numerical schemes for solving this coupled nonlinear system, and show ample numerical results (drop formation and pitching-off, defect motion in liquid crystal flow, etc.) which not only demonstrate the effectiveness of the numerical schemes, but also validate the flexibility and robustness of the phase-field model.