DECOUPLED, ENERGY STABLE SCHEMES FOR PHASE-FIELD MODELS OF TWO-PHASE INCOMPRESSIBLE FLOWS

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Abstract
In this paper we construct two classes, based on stabilization and convex splitting, of decoupled, unconditionally energy stable schemes for Cahn-Hilliard phase-field models of two-phase incompressible flows. At each time step, these schemes require solving only a sequence of elliptic equations, including a pressure Poisson equation. Furthermore, all of these elliptic equations are linear for the schemes based on stabilization, making them the first, to the best of the authors' knowledge, totally decoupled, linear, unconditionally energy stable schemes for phase-field models of two-phase incompressible flows. Thus, the schemes constructed in this paper are very efficient and easy to implement.

Keywords
Author Keywords: phase-field, two-phase flow, Navier-Stokes; Cahn-Hilliard; energy stable
KeyWords Plus: SHALLOW-WATER EQUATIONS; CAHN-HILLIARD EQUATION; VARIABLE-DENSITY; COMPLEX FLUIDS; ERROR ANALYSIS; APPROXIMATION; DYNAMICS; EVOLUTION; GROWTH

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