Preconditioning for a phase-field model for the morphology evolution in organic solar cells

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In this study, we address the numerical investigation of a phase-field model for the formation of acceptor and donor regions during the production of organic solar cells. This process is driven by the spinodal decomposition of two species in a solvent, where the solvent evaporates, resulting in a coupling of phase field equations via degenerate mobility. The model, described by coupling the Cahn–Hilliard equations and Navier-Stokes equations, is discretized using a finite element approach. To solve the resulting large-scale linear systems efficiently, we introduce a preconditioning strategy based on efficient approximations of the Schur-complement of a saddle point system. To illustrate the efficiency of our methodology, we provide several numerical examples.

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