A block-preconditioner for Cahn–Hilliard systems modelling the morphology evolution in organic semiconductors

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The Cahn–Hilliard equations are a versatile model for describing the evolution of complex morphologies. In this talk, we present a computational framework for the numerical solution of a ternary phase-field model for describing the nanomorphology of donor–acceptor semiconductor blends used in organic photovoltaic devices. The model consists of two coupled fourth-order partial differential equations that are discretized using a finite element approach. In order to solve the resulting large-scale linear systems efficiently, we propose a preconditioning strategy that is based on efficient approximations of the Schur-complement of a saddle point system. We show that this approach performs robustly with respect to variations in the discretization parameters.

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