Computational Mathematics Seminar Series

The Cahn-Hilliard Equation, a Robust Solver, and a Phase Field Model for Liquid Crystal Droplets

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Digital Media Center 1034
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Abstract:
We begin with an introduction to the Cahn-Hilliard equation and some motivation for the use of phase field models. We will then go on to describe a first order finite element method for the Cahn-Hilliard equation and the development of a robust solver for that method. The key ingredient of the solver is a preconditioned minimal residual algorithm (with a multigrid preconditioner) whose performance is independent of the spatial mesh size and the time step size for a given interfacial width parameter.

In the second part of the talk, we present a novel finite element method for a phase field model of nematic liquid crystal droplets. The model considers a free energy comprised of three components: the Ericksen's energy for liquid crystals, the Cahn-Hilliard energy for phase separation, and an anisotropic weak anchoring energy that enforces a boundary condition along the interface between the droplet and surrounding substance. We present the key properties of the finite element method for this model including energy stability and convergence and conclude with a few numerical experiments.

Speaker's Bio:
Dr. Diegel graduated with her PhD from the University of Tennessee in May of 2015. Since then she has enjoyed her time as a postdoctoral researcher at Louisiana State University working with Professors Brenner, Sung, and Walker. The work presented during her upcoming talk will cover that which she has accomplished while at LSU.

This lecture has refreshments @ 03:00 pm

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