

Department of Mathematics

University of Houston

Scientific Computing Seminar

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Numerical modelling of lateral phase separation on deforming surfaces, including merging and pinching

Thursday, January 23, 2020

1:30 PM- 2:30 PM

Room 646 PGH

Abstract: We discuss a model of lateral phase separation in a two-component thin material layer, a prototypical problem for understanding spinodal decomposition and pattern formation observed in biological membranes, e.g., lipid bilayers. The modeling part leads to a fourth order nonlinear PDE that can be seen as the Cahn-Hilliard equation posed on a time-dependent surface. Elementary tangential calculus and the embedding of the surface in \mathbf{R}^3 are used to formulate the model, thereby facilitating the development of a fully Eulerian discretization method to solve the problem numerically. We discuss a numerical approach based on geometrically unfitted finite element spaces. The talk will be illustrated with animated computations of pattern formation on a number of steady and evolving shapes, including examples with merging and splitting spheres. .

- This is a joint work with Drs. A. Quaini (UH, Mathematics) and V. Yushutin (UH, Mathematics)