

TEMPLE UNIVERSITY
Department of Mathematics

Applied Mathematics and Scientific Computing Seminar

Wednesday, 27 January 2016, 4:00 p.m.
Room 617 Wachman Hall

(refreshments and social at 3:45 p.m)

Numerical methods for solving the Cahn-Hilliard equation and its applicability to mixtures of two incompressible fluids with different densities

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Abstract. The Cahn-Hilliard model was originally introduced to describe the complicated phase separation and coarsening phenomena in the mixture of different fluids, solid or gas where only two different concentration phases can exist stably. During the seminar I will present different numerical schemes to approximate the Cahn-Hilliard model, showing the advantage and disadvantages of each scheme. In particular, I will focus on the study of the constraints on the physical and discrete parameters that can appear to assure the energy-stability, unique solvability and, in the case of nonlinear schemes, the convergence of Newtons method to the nonlinear schemes. Moreover, an adaptive time stepping algorithm will be presented and the behavior of the schemes will be compared through several computational experiments. In the second part of the seminar, I will summarize a thermodynamical consistent model for mixtures of fluids with different densities (based on the Cahn-Hilliard equation) and I will present a splitting numerical scheme that segregates the computation of the fluid part from the phase field part in a linear an energy-stable way. Finally, some numerical simulations for this model will be presented to show the effectiveness of the proposed numerical scheme.