TEMPLE UNIVERSITY
Department of Mathematics

Applied Mathematics and Scientific Computing Seminar

Room 617 Wachman Hall

Wednesday, April 18 2007, 4 p.m.

Dynamics of lattice phase transitions

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A characteristic feature of lattice phase transitions in active materials is the energy dissipation leading to experimentally observed hysteresis. The dissipation is due to propagating phase boundaries that can be represented at the continuum level as surfaces of discontinuity. Classical elastodynamics admits nonzero dissipation on moving discontinuities but provides no information about its origin and kinetics. This ambiguity leads to an ill-posed initial value problem. I will show how one can regularize the problem and account for energy dissipation by replacing the continuum model with its natural discrete prototype (joint work with Lev Truskinovsky). After introducing these ideas for a one-dimensional lattice with long-range interactions, I will discuss my recent work with Yubao Zhen on kinetics of atomic steps along a phase boundary in a three-dimensional lattice undergoing antiplane shear deformation.