For favour of Posting

THE HONG KONG UNIVERSITY OF SCIENCE & TECHNOLOGY
Department of Mathematics

SEMINAR ON APPLIED MATHEMATICS

New phase-field models for solid-solid phase transitions driven by material forces

by

Prof. Peicheng ZHU
Shanghai University

Abstract

I will give a series of talks that are based on the work by the speaker and his colleagues during last two decades or so. We first present two new types of phase-field models, which were formulated in the beginning of this century，by H.-D. Alber (from Tech. Univ. Darmstadt, Germany) and the speaker, for solid-solid phase transformations driven by configurational forces in elastically deformable solids. Mathematically these two models consist of a linear elasticity subsystem coupled to a nonlinear, degenerate parabolic equation of second or fourth order, and the two models differ, respectively, from the well-known Allen-Cahn and Cahn-Hilliard models by a non-smooth gradient term of an order parameter.

Part II Global solutions to a phase-field models for structural phase transitions driven by material forces

We simply the model studied in Part I, however the essential difficulties remain. And we prove the existence of viscosity solutions in 3-D case.

Part III Weak solutions to an IBVP of a phase-field model for motion of grain boundaries

We shall prove global existence of weak solutions to an initial-boundary value problem for a novel phase-field model which is an elliptic-parabolic coupled system. This model is proposed as an attempt to describe the motion of grain boundaries, a type of interface motion by interface diffusion driven by bulk free energy in elastically deformable solids. Its applications include important processes arising in Materials science, e.g., Sintering. In this model the evolution equation for an order parameter is a non-uniformly, degenerate parabolic equation of fourth order, which differs from the Cahn-Hilliard equation by a non-smooth term of the gradient of the unknown.

Date : 11 February 2025 (Tuesday)

Time : 3:00p.m.-5:00p.m.

Venue : Room 2306 (Lift 17/18)

All are Welcome!