



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

Part I: Weak solutions to a phase-field models for solid-solid phase transitions driven by material forces

By

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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.

In the first part, we prove the existence of weak solutions to one of the above models, in which the order parameter is conserved. Two types of weak solutions will be presented, i.e., usual weak solution (defined by employing the technique of integration by parts), and weak solution defined by combining the usual concept of weak solution and the notion of viscosity solutions. Applications include: to describe martensitic phase transitions in, e.g., Shape Memory Alloys. Numerical results will also be shown.

Date : 06 February 2025 (Thursday)

Time : 4:00pm - 5:00pm

Venue : Room 3598 (Lift 27/28)

All are Welcome!