

THE UNIVERSITY



OF HONG KONG

Department of Mathematics

COLLOQUIUM

History-dependent variational-hemivariational inequalities in Contact Mechanics

Professor Mircea Sofonea

University of Perpignan Via Domitia, France

Abstract

We present recent results in the study of variational-hemivariational inequalities with applications to Contact Mechanics. We start by introducing the concept of history-dependent operator together with relevant examples in analysis, ordinary differential equations and mechanics. Then, we state and prove an existence and uniqueness result for a class of variational-hemivariational inequalities with history-dependent operators, the so-called history-dependent inequalities. The proof is based on arguments of pseudomonotonicity and fixed point. Under additional assumptions, we proceed with the study of the behavior of the solution with respect to the set of constraints and prove a continuous dependence result. To this end we use various estimates, monotonicity arguments and the properties of the Clarke subdifferential.

Next, we consider a mathematical model which describes the equilibrium of a locking material with memory, in contact with an obstacle. We comment the model and state its weak formulation, which is in a form of a history-dependent variational hemivariational inequality for the displacement field. We use our abstract results to prove the unique weak solvability of the model and the continuous dependence of the solution with respect to the set of constraints. We apply this convergence result in the study of an optimization problem associated to the contact model. Finally, we list additional results concerning the numerical analysis of history-dependent variational-hemivariational inequalities and provide numerical simulations in the study of a second mathematical model which describes the contact between an elastic body with a rigid-deformable foundation.

Date: October 3, 2018 (Wednesday)

Time: 5:00 – 6:00pm

Venue: Room 210, Run Run Shaw Bldg., HKU

All are welcome