Discrete Mathematics Seminar

Time: Friday, 15 April 2011, 12:30-1:30 PM
Room: 238 Derrick Hall
Title: Semismooth Newton Methods for Variational Inequalities in PDE Problems
Speaker: Dr. Georg Stadler, Institute for Computational Engineering and Sciences, UT

Abstract:

Variational inequalities in PDE systems emerge either directly from the physical
properties of the system (e.g., friction and contact, plasticity, Bingham flow or rheologies
with yielding), or originate from optimization and inverse problems with PDEs due to
constraints or non-differentiabilities (e.g., pointwise constraints in PDE-constrained
optimization, total variation regularization for inverse problems, sparsity-promoting
functionals). I will present algorithms for an efficient solution of these variational
inequality problems. These methods are based on Lagrange multipliers, complementarity
functions and generalized Newton methods, and their performance and analysis depends
on the properties of the underlying PDE solution operators. The application of these
methods to contact and friction problems in elasticity, to non-differentiable regularization
in inverse problems and to the solution of flow problems with sheer thickening rheology
will be discussed.