Title: Stability Analysis of Generalised Equations with Applications

Abstract: Generalized equations in optimization include linear and nonlinear inequality systems and linear and nonlinear variational inequality problems. In practical application problems, basic data in the models such as demand, prices, resources, technical parameters etc. are often not estimated accurately. Stability analysis of generalized equations is to determine intuitively verifiable conditions to guarantee that the accuracy of the solutions obtained increase with the degree of approximation of the initial data. The literature on the subject is vast. However existing results of generalized equations are mainly concentrated on canonical perturbation of linear and nonlinear inequality systems and linear and nonlinear variational inequality problems.

This project will study stability of generalized equations with an explicit set constraint and the matrix perturbation of a linear constraint system. These considerations are motivated by the facts that the explicit treatment of the set constraint allows one to use its special structure when calculating its normal cone and that the projection on the intersection of two simple polyhedral sets may be easily computed by alternating projection onto each simple polyhedral set. Moreover it is worth noting that the matrix perturbation of a linear constraint system arises in some linear portfolio selection optimization problems. Our approach relies on the Mordukhovich criterion, a remarkable variational analysis tool in the study of stability. We will study the Lipschitz-like continuity of the set of solutions of a fully perturbed linear constraint system with a set constraint and apply the obtained results to sparse linear complementarity problems. We will investigate the Lipschitz-like property of the stationary set of linear and nonlinear variational inequality problems with a matrix perturbation in the linear constraint system by virtue of a unconstrained minimization approach and a set constraint approach respectively. We will apply the obtained results to linear portfolio optimization problems.