Title: Relative Stability Analysis for Parametric Optimization Problems

Abstract: Parametric optimization problems are important in the study of nonlinear optimization theory. Their applications appear in engineering design, financial management and operations research modeling. In practical application problems, basic data in the models such as demands, resources, market frictions, technical parameters etc. are often not estimated accurately. Stability analysis is to establish verifiable optimality conditions to guarantee that the accuracy of the solutions obtained increases with the degree of approximation of the initial data. The Lipschitz-like property is at the core of stability theory. By virtue of coderivative, Mordukhovich criterion provides a necessary and sufficient condition of the Lipschitz-like property of set-valued mappings and has widely been applied in the study of solution mappings of various parametric optimization problems. However one important assumption of the Mordukhovich criterion is that the candidate point need to be in the interior of the domain of set-valued mappings. This is in general a very restrictive assumption. Recently a projectional coderivative of a set valued mapping has been introduced and applied to establish a generalized Mordukhovich criterion for characterizing the Lipschitz-like property relative to a closed and convex set. The study of the Lipschitz-like property relative to a set is important in twofold: practical applications consideration and minimum constraint qualification requirement.

In this project we will establish the chain rule and the sum rule of the projectional coderivative for the compositions of set-valued mappings by virtue of variational analysis tools including properties of projections. We will investigate necessary and sufficient conditions for the solution mapping of a parametric generalized equation to be Lipschitz-like relative to a closed and convex set and apply them to study that of a 2/51 Page 3 GRF1 RGC Ref No. 15209921 parametric linear constraint system under a regularity assumption. We will investigate the Lipschitz-like property of the solution mapping relative to its convex cone domain for a parametric linear complementarity problem with a Q_0 matrix. We will obtain a generalized critical face condition for characterizing the Lipschitz-like property relative to a polyhedral convex set for the solution mapping of a parametric affine variational inequality problem over polyhedral convex sets. We will investigate the strong regularity of a parametric nonlinear variational inequality problem.