Mathematical Programs with Equilibrium Constraints in Function Space

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Abstract

Many problems in practical applications lead to the minimization of an objective subject to complementarity or variational inequality constraints. Examples are control of obstacle or contact problems, calibration problems in option pricing, parameter identification in lubrication problems etc. These problems are challenging due the fact that constraint qualifications for (Lagrange) multiplier existence generically fail such that alternative techniques for deriving first order optimality conditions need to be derived. Moreover, the typical non-convexity and non-smoothness of the problems challenge the development of solution algorithms.

In this talk, for classes of elliptic and parabolic mathematical programs with equilibrium constraints (MPECs) in function space several analytical techniques for deriving first order optimality systems are discussed. Different stationarity principles such as B, C, or strong stationarity are highlighted, and, in the derivation of these stationarity systems, a particular focus is put on relaxation and nonsmooth variational techniques. Aspects of current algorithmic developments including a report on numerical results are given. The talk ends by a brief discussion of open problems in the field.

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