VARIATIONAL ANALYSIS IN SEMI-INFINITE AND INFINITE OPTIMIZATION

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Abstract

This talk concerns parametric problems of infinite and semi-infinite programming, where functional constraints are given by systems of infinitely many linear inequalities indexed by an arbitrary set, where decision variables run over Banach (infinite programming) or finite-dimensional (semi-infinite case) spaces, and where objectives are generally described by nonsmooth and nonconvex cost functions. The parameter space of admissible perturbations in such problems is formed by all bounded functions over the index set equipped with the standard supremum norm. By using advanced tools of variational analysis and generalized differentiation and largely exploiting underlying specific features of linear infinite constraints, we establish complete characterizations of robust Lipschitzian stability (with computing the exact bound of Lipschitzian moduli) for parametric maps of feasible solutions governed by linear infinite inequality systems and then derive verifiable necessary optimality conditions for the infinite and semi-infinite programs under consideration expressed in terms of their initial data. A crucial part of our analysis addresses the precise computation of coderivatives and their norms for infinite systems of parametric linear inequalities in general Banach spaces of decision variables. The results obtained are new in both frameworks of infinite and semi-infinite programming. We also discuss extensions of these results to nonsmooth convex and smooth nonlinear infinite systems.

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