On Lipschitz and Hölder stability of stationary solutions to nonlinear optimization problems

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Abstract

There is a broad and well-developed theory of Hölder and Lipschitz stability analysis of optimization problems, variational inequalities and complementarity problems, we refer, e.g., to the monographs by Bonnans/Shapiro (2000), Klatte/Kummer (2002), Facchinei/Pang (2003) and Dontchev/Rockafellar (2009, 2nd ed. 2014). In this talk, we concentrate on special aspects of this theory and recall classical results, discuss some refinements of them and show limitations of the theory by appropriate examples. The presentation consists of two parts. In the first part, we recall characterizations of strong Lipschitz stability (also called Lipschitzian localization) of the stationary point map X of a nonlinear program under different constraint qualifications, and we discuss the differences and limitations of the results in comparison with the KKT mapping or the optimal solution set mapping. In the second part, we recall a classical result on upper Hölder stability of X near some given parameter-solution pair (p^*, x^*) if the initial point x^* is a local minimizer, and we present an interesting extension to MPECs. Part 1 is based on common work with Bernd Kummer, Humboldt University Berlin, see [2]. Part 2 is based on a recent paper written with Helmut Gfrerer, Johannes Kepler University Linz, see [1].

References

[1] H. Gfrerer, D. Klatte. *Lipschitz and Hölder stability of optimization problems and generalized equations,* Mathematical Programming 158 (2016) 35-75.

[2] D. Klatte, B. Kummer. *Strong Lipschitz stability of stationary solutions for nonlinear programs and variational inequalities,* SIAM Journal on Optimization 16 (2005) 96-119.

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