Critical objective size and calmness modulus in linear programming^{*}

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Abstract

This talk introduces the concept of critical objective size associated with a linear program in order to provide operative point-based formulas (only involving the nominal data, and not data in a neighborhood) for computing or estimating the calmness modulus of the optimal set (argmin) mapping under uniqueness of nominal optimal solution and perturbations of all coefficients. Our starting point is an upper bound on this modulus given in [1]. In this talk we show that this upper bound is attained if and only if the norm of the objective function coefficient vector is less than or equal to the critical objective size. This concept also allows us to obtain operative lower bounds on the calmness modulus. We analyze in detail an illustrative example in order to explore some strategies that can improve the referred upper and lower bounds.

Keywords. Variational analysis \cdot Calmness \cdot Linear programming

Mathematics Subject Classification: 90C31, 49J53, 49K40, 90C05.

References

1. Cánovas, M. J., Hantoute, A., Parra, J., Toledo, F.J.: Calmness modulus of fully perturbed linear programs. Submitted to Math. Program. (2014)

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