Beer, G.; Cánovas, M. J.; López, M. A.; Parra, J.
Lipschitz modulus of linear and convex inequality systems with the Hausdorff metric.
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Summary: This paper analyzes the Lipschitz behavior of the feasible set mapping associated with linear and convex inequality systems in \( \mathbb{R}^n \). To start with, we deal with the parameter space of linear (finite/semi-infinite) systems identified with the corresponding sets of coefficient vectors, which are assumed to be closed subsets of \( \mathbb{R}^{n+1} \). In this framework the size of perturbations is measured by means of the (extended) Hausdorff distance. A direct antecedent, extensively studied in the literature, comes from considering the parameter space of all linear systems with a fixed index set, \( T \), where the Chebyshev (extended) distance is used to measure perturbations. In the present work we propose an appropriate indexation strategy which allows us to establish the equality of the Lipschitz moduli of the feasible set mappings in both parametric contexts, as well as to benefit from existing results in the Chebyshev setting for transferring them to the Hausdorff one. In a second stage, the possibility of perturbing directly the set of coefficient vectors of a linear system leads to new contributions on the Lipschitz behavior of convex systems via linearization techniques.

MSC:
90C31 Sensitivity, stability, parametric optimization
49J53 Set-valued and variational analysis
49K40 Sensitivity, stability, well-posedness
90C05 Linear programming
90C25 Convex programming
90C34 Semi-infinite programming

Keywords:
Lipschitz modulus; feasible set mapping; convex inequalities; Hausdorff metric; indexation

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References: