AE regularity of interval matrices

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Abstract

Consider a linear system of equations with interval coefficients, and each interval coefficient is associated with either a universal or an existential quantifier. The AE solution set [1, 2, 3] is defined by $\forall\exists$-quantification. That is, a vector x is an AE solution if for every realization of $\forall$-coefficients there is a realization of $\exists$-coefficients such that x solves the corresponding system. Applications of this approach range from economic models, design problems to static control systems, among others.

Herein, we deal with the problem what properties must the coefficient matrix have in order that there is guaranteed an existence of an AE solution. Based on this motivation, we introduce a concept of AE regularity, which implies that the AE solution set is nonempty. We discuss characterization of AE regularity, and we also focus on various classes of matrices that are implicitly AE regular. Some of these classes are polynomially decidable, and therefore give an efficient way for checking AE regularity.

Keywords

Interval matrix, Interval computation, Linear equations, Forall-exists quantification.

References

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