Summary: We deal with interval parametric systems of linear equations and the goal is to solve such systems, which basically comes down to finding an enclosure for a parametric solution set. Obviously, we want this enclosure to be tight and cheap to compute; unfortunately, these two objectives are conflicting. The review of the available literature shows that in order to make a system more tractable, most of the solution methods use left preconditioning of the system by the midpoint inverse. Surprisingly, and in contrast to standard interval linear systems, our investigations have shown that double preconditioning can be more efficient than a single one, both in terms of checking the regularity of the system matrix and enclosing the solution set, which is demonstrated by numerical examples. Consequently, right (which was hitherto mentioned in the context of checking regularity of interval parametric matrices) and double preconditioning together with the p-solution concept enable us to solve a larger class of interval parametric linear systems than most existing methods. The applicability of the proposed approach to solving interval parametric linear systems is illustrated by several numerical examples.

MSC:

15A06 Linear equations (linear algebraic aspects)
15B99 Special matrices
65G40 General methods in interval analysis
68U99 Computing methodologies and applications

Keywords:

preconditioning; revised affine forms; interval parametric linear systems; parametric solution

Full Text: DOI

References:

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