Enclosing the solution set of overdetermined systems of interval linear equations

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We describe two methods to bound the solutions of interval full rank least squares problems $\|\mathbf{A}x - \mathbf{b}\|$ where $\mathbf{A} \in \mathbb{IR}^{n\times m}$, $n \geq m$ is an $n \times m$ full rank interval matrix and $\mathbf{b} \in \mathbb{IR}^n$ is an interval vector. The methods are based on the concept of generalized solution of overdetermined systems of linear equations. We use two type of preconditioning the $n \times m$ system: multiplying the system with the generalized inverse of the midpoint matrix or with the transpose of the midpoint matrix. It results an $m \times m$ system which we solve using Gaussian elimination or the method provided by J. Rohn in [2]. We give some examples in which we compare the efficiency of our methods and compare the results with the interval Householder method [1].

References

[1] A.H. Bentbib, *Solving the full rank interval least squares problem*, Applied Numerical Mathematics, **41** (2002), 283-294.

[2] J. Rohn, *An algorithm for computing the hull of the solution set of interval linear equations*, Linear Algebra and Its Applications, **435** (2011), 193-201.