On using global optimization method for approximating interval hull solution of parametric linear systems

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Abstract

Systems of parametric linear interval equations are encountered in many practical applications. Parametric linear interval system is a family of real linear systems. Parametric solution set is hence a set of all solutions of real systems from the family. In general case the parametric solution set is not an interval vector. Hence instead of the parametric solution set itself, inner and outer interval vector solutions are calculated. The tightest outer interval solution is called an interval hull solution. To calculate the interval hull solution $2n$ constrained optimization problems must be solved. To solve this problems a global optimization method is used with some accelerating techniques, e.g. monotonicity test. The monotonicity test is performed using a direct method for solving parametric liear interval systems. If the first derivative, has a constant sign in the a whole subbox, then the subbox is reduced to point interval being one of its edges. Some other techniques like special ordering of subdivided boxes is also used. A bisection and multisection techniques are compared. Various subdivision direction selections rules are tested.

References

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