# Skew Box Enclosure for the Parametric AE Solution Set

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Consider linear algebraic systems $A(p)x = b(p)$ where the elements of the matrix $A(p)$ and the vector $b(p)$ are linear functions of uncertain parameters varying within given intervals, $p_i \in [p_i]$, $i = 1, \ldots, k$. For two disjoint sets $\mathcal{E}$ and $\mathcal{A}$, such that $\mathcal{E} \cup \mathcal{A} = \{1, \ldots, k\}$, the parametric AE solution set of the above system is defined by

$$\begin{aligned}\Sigma^p_{AE} &= \Sigma(A(p), b(p), [p]) \\ &:= \{x \in \mathbf{R}^n \mid (\forall p_{\mathcal{A}} \in [p_{\mathcal{A}}])(\exists p_{\mathcal{E}} \in [p_{\mathcal{E}}])(A(p)x = b(p))\}.\end{aligned}$$

A single step parametric method, called Bauer-Skeel method, based on the left-preconditioned system, is proposed in [1] for the outer estimation of a parametric AE solution set.

In this talk we present a outer estimate of the parametric AE solution set by right-preconditioning of the parametric matrix. The obtained outer estimate is in the form of a parallepiped, called skew box. A right-preconditioning version of the parametric Bauer-Skeel method for outer estimation of the parametric AE solution set will be presented. In the special case of parametric united solution set a right-preconditioning version of the parametric fixed-point iteration will be outlined. The properties and the usefulness of the new outer estimation will be discussed on a number of numerical examples.

## References

[1] E.D. Popova, M. Hladík, *Outer enclosures to the parametric AE solution set*, Soft Computing, 2013, doi:10.1007/s00500-013-1011-0.