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Algebraic test for the Hurwitz stability of a given segment of polynomials. (English)

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Summary: For the robust stability analysis of a linear system, due to the nonconvexity of the set of Hurwitz stable polynomials, it is important to have available computational methods to verify the stability of a convex combination of polynomials. In this paper, given two Hurwitz stable polynomials p_0 and p_1, a simple algebraic test (a matrix inequality) for the stability of the segment of polynomials determined by p_0 and p_1 is proposed. Based on this result the problem of estimating of the minimum left extreme is addressed.

MSC:

93D09 Robust stability
34D99 Stability theory for ordinary differential equations
93C05 Linear systems in control theory

Keywords:

Hurwitz stable polynomials; segments of polynomials; minimum left extreme; matrix inequalities