

# Infinite matrices - computable stability conditions for time-delay systems

Prashant Batra

*Hamburg University of Technology, Germany*

## Abstract

Hurwitz' stability criterion for polynomials does not carry over to general entire functions (i.e. functions holomorphic everywhere in the complex plane). Entire functions connected to delay-difference equations of retarded type still possess many properties of polynomials. It is known, e.g., that the Hermite-Biehler criterion for stability carries over to this class while the Hurwitz' criterion does not. Alas, non-trivial, non-polynomial solutions of systems of retarded type have infinitely many zeros which renders the Hermite-Biehler criterion impractical. We show how to work with the infinite analogues of the Hurwitz and Bezout matrices to obtain finite, effectively computable, sufficient stability tests.

## Keywords

Totally positive matrices, Linear time-delay systems, Constructive computable criterion.

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