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A bisection method for measuring the distance of a stable matrix to the unstable matrices.

(English) [Zbl 0658.65044](#)

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The author develops a bisection method to determine the 2-norm and Frobenius norm distance from a given matrix A to the nearest matrix with an eigenvalue on the imaginary axis. This distance measures how “nearly unstable” A is when all its eigenvalues lie in the open left half plane. Each step provides either a rigorous upper bound or rigorous lower bound on the distance. A few bisection steps can bracket the distance within an order or magnitude. Bisection avoids the difficulties associated with nonlinear minimization techniques and the occasional failures associated with heuristic estimates. The method is used to estimate the distance to the nearest matrix with an eigenvalue on the unit circle.

Reviewer: [P.Narain](#)

MSC:

65F30 Other matrix algorithms (MSC2010)

15A60 Norms of matrices, numerical range, applications of functional analysis to matrix theory

Cited in **1** Review
Cited in **63** Documents

Keywords:

[distance of a stable matrix to the unstable matrices](#); [stable matrix](#); [Hamiltonian matrix](#); [bisection method](#); [Frobenius norm](#)

Software:

[EISPACK](#)

Full Text: [DOI](#)