

Norm bounds for matrix inverses

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Abstract

An easily calculable upper bound for the infinity norm of the inverse of \mathcal{S} -SDD matrices, introduced by Gao and Wang in 1992, is obtained in the first part. Applying that bound to SDD matrices, we improve the Ahlberg-Nilson-Varah bound. In the second part, we obtain two easily calculable lower bounds for $\|A^{-1}\|$, where $\|\cdot\|$ is an arbitrary matrix norm, in the case when A is an M-matrix, using first row sums and then column sums. Using those results, we obtain the characterization of M-matrices which inverse is a stochastic matrix. With different approach, we give another easily calculable lower bounds for $\|A^{-1}\|_\infty$ and $\|A^{-1}\|_1$ in the case when A is an M-matrix. In the third part we obtain our main result, an easily calculable upper bound for $\|A^{-1}\|_1$ in the case when A is an SDD matrix, thus improving the known bound. All mentioned norm bounds can be used for bounding the smallest singular value of a matrix.