Geometrical properties and new bounds for the Frobenius condition number

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Abstract

We discuss new lower bounds for the Frobenius condition number of symmetric and positive definite(SPD) matrices, that only require the trace and the Frobenius norm of the matrix. These bounds are obtained by exploiting the geometrical properties of the Frobenius condition number in the cone of SPD matrices. In addition, for any given general matrix A, we study the relationship between the Frobenius condition number of $A^T A$ and the square of the Frobenius condition number of A. Using this relationship we obtain new bounds for the Frobenius condition number of nonsymmetric matrices.