

COLLOQUIUM

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Stability and Convex Hulls of Matrix Powers



Mathematics
and
Statistics

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Abstract: Invertibility of all convex combinations of a matrix A and the identity matrix I is equivalent to the real eigenvalues of A , if any, being positive. Invertibility of all matrices whose rows are convex combinations of the respective rows of A and I is equivalent to all of the principal minors of A being positive (i.e., A being a P -matrix). These results are extended to convex combinations of higher powers of A and of their rows. The invertibility of matrices in these convex hulls is associated with the eigenvalues of A lying in open sectors of the right-half plane. The ensuing analysis provides a new context for open problems in the theory of matrices with P -matrix powers. Joint work with P. K. Torres.