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Positivity criteria generalizing the leading principal minors criterion

This is joint work with *Vyacheslav Futorny* and *Vladimir V. Sergeichuk*, which is published in [1].

An $n \times n$ Hermitian matrix is positive definite if and only if all leading principal minors $\Delta_1, \dots, \Delta_n$ are positive. We show that certain sums δ_l of $l \times l$ principal minors can be used instead of Δ_l in this criterion. We describe all suitable sums δ_l for 3×3 Hermitian matrices. For an $n \times n$ Hermitian matrix A partitioned into blocks A_{ij} with square diagonal blocks, we prove that A is positive definite if and only if the following numbers σ_l are positive: σ_l is the sum of all $l \times l$ principal minors that contain the leading block submatrix $[A_{ij}]_{i,j=1}^{k-1}$ (if $k > 1$) and that are contained in $[A_{ij}]_{i,j=1}^{k}$, where k is the index of the block A_{kk} containing the (l, l) diagonal entry of A. We also prove that σ_l can be used instead of Δ_l in other inertia problems.

[1] Futorny V., Sergeichuk V.V., Zharko N. // Positivity — 2007. — **11**, N 1.