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A POLYNOMIAL TIME SPECTRAL DECOMPOSITION TEST FOR CERTAIN CLASSES OF INVERSE M-MATRICES*

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Dedicated to Hans Schneider on the occasion of his seventieth birthday

Abstract. The primary result in this paper is a set of $O(n^3)$ time algorithms to determine whether a specified real, symmetric matrix is a member of any of several closely related classes: the MMA-matrices; the inverse MMA-matrices; the strictly positive, positive definite matrices whose eigenvectors form a Soules basis; and the strictly ultrametric matrices. When the class membership question is answered in the affirmative for an MMA-matrix or an inverse MMA-matrix, the algorithms also yield the complete spectral decomposition of the matrix in question. Additional results in this paper include an algorithmic test for when a matrix is a Soules matrix, and a construction for Soules bases.

AMS subject classifications. 15A48, 15A18

Key words. MMA-matrix, inverse M-matrix, Soules matrix, strictly ultrametric matrix

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