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Z-PENCILS*

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Abstract. The matrix pencil $(A, B) = \{tB - A \mid t \in \mathbb{C}\}$ is considered under the assumptions that A is entrywise nonnegative and $B - A$ is a nonsingular M-matrix. As t varies in $[0, 1]$, the Z-matrices $tB - A$ are partitioned into the sets L_s introduced by Fiedler and Markham. As no combinatorial structure of B is assumed here, this partition generalizes some of their work where $B = I$. Based on the union of the directed graphs of A and B, the combinatorial structure of nonnegative eigenvectors associated with the largest eigenvalue of (A, B) in $[0, 1)$ is considered.

Key words. Z-matrix, matrix pencil, M-matrix, eigenspace, reduced graph.

AMS subject classifications. 15A22, 15A48, 05C50

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