

The number of P-vertices of singular acyclic matrices: An inverse problem

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Let A be a real symmetric matrix. If after deleting a row and a column of the same index, the nullity increases by one, we call that index a P-vertex of A . When A is an $n \times n$ singular acyclic matrix, i.e., a matrix whose graph is a given tree T , it is known that the maximum number of P-vertices is $n - 2$. We will see that for any integer number $k \in \{0, 1, \dots, n - 2\}$, there is a (singular) matrix with k P-vertices whose graph is T . An algorithm and several illustrative examples will be provided.

Keywords: trees, acyclic matrices, singular matrices, multiplicity of eigenvalues, P-set, P-vertices