

Irreducible Sign Patterns of Minimum Rank of 3 and Symmetric Sign Patterns That Allow Diagonalizability

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Abstract : It is known that irreducible sign patterns in general may not allow diagonalizability and in particular irreducible sign patterns with minimum rank greater than or equal to 4. It is also known that every irreducible sign pattern matrix with minimum rank of 2 allow diagonalizability with rank of 2 and the maximum rank of the sign pattern. In general sign patterns with minimum rank of 3 may not allow diagonalizability if the condition of irreducibility is dropped, but the problem of whether every irreducible sign pattern with minimum rank of 3 allows diagonalizability remains open. In this paper it is shown that irreducible sign patterns with minimum rank of 3 under certain conditions on the underlying graph allow diagonalizability. An alternate proof of the results that every sign pattern matrix with minimum rank of 2 and no zero lines allow diagonalizability with rank of 2 and also that every full sign pattern allows diagonalizability with all permissible ranks of the sign pattern is given. Some open problems regarding composite cycles in an irreducible symmetric sign pattern that support of a rank principal certificate are also answered.

Keywords : irreducible sign patterns, minimum rank, symmetric sign patterns, rank -principal certificate, allowing diagonalizability

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