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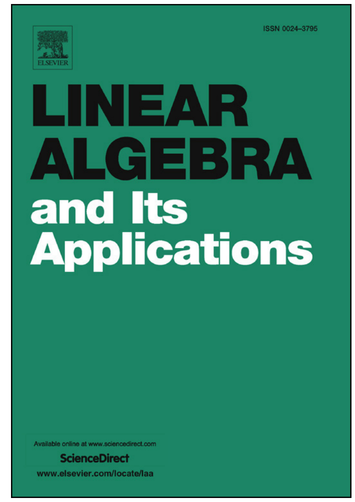

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A matrix description of weakly bipartitive and bipartitive families

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Abstract

The notions of weakly bipartitive and bipartitive families were introduced by Montgolfier (2003) as a general tool for studying some decomposition of graphs and other combinatorial structures. One way to construct such families comes from a result of Loewy (1986): Given an irreducible $n \times n$ matrix A over a field, the family of partitions $\{X, Y\}$ of $\{1, \ldots, n\}$ such that the submatrices $A[X, Y]$ and $A[Y, X]$ have a rank at most 1 is weakly bipartitive. In this paper, we show that this family is bipartitive when A is symmetric. In the converse direction, we prove that weakly bipartitive and bipartitive families are all obtained via the construction above.

Keywords: Graphs; Modular decomposition; Bipartitive families; Matrices.
2000 MSC: 05C20, 15A03

1. Introduction

Modular decomposition arose in various combinatorial areas for structures like graphs, tournaments, hypergraphs, matroids, etc. It is based on the notion of a module. For graphs, this notion goes back to Gallai [6, 10]. More precisely, let $G = (V, E)$ be an undirected simple graph. A *module* of G is a set $M \subseteq V$ such that for all $x \in V \setminus M$ either $N_G(x) \cap M = \emptyset$ or $M \subseteq N_G(x)$,

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