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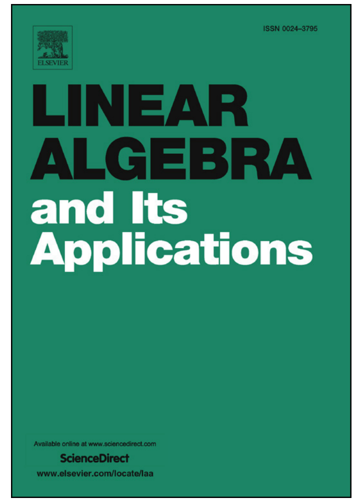

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On the spectral radius of uniform hypertrees

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Abstract

We determine the unique hypertrees with maximum spectral radius among k-uniform non-hyper-caterpillars with m edges and diameter d for $4 \leq d \leq m-2$, among k-uniform non-hyper-caterpillars with m edges for $m \geq 6$, among k-uniform hypertrees with m edges and independence number α for $\lceil \frac{m(k-1)+1}{k} \rceil \leq \alpha \leq m$, among k-uniform hypertrees with m edges and matching number β for $1 \leq \beta \leq \lfloor \frac{m(k-1)+1}{k} \rfloor$, and among k-uniform hypertrees with m edges and s branch vertices for $0 \leq s \leq \lfloor \frac{m-1}{2} \rfloor$, respectively.

MSC: 05C50, 05C65

Key words: spectral radius, adjacency tensor, uniform hypergraph, independence number, matching number, branch vertices

1 Introduction

A hypergraph G is a pair (V, E), where $V = V(G)$ is a nonempty finite set (the vertex set) and $E = E(G)$ is a family of distinct subsets of V (the edge set), where each edge contains at least two vertices. For an integer $k \geq 2$, we say that G is k-uniform if every edge has size k. A 2-uniform hypergraph is a simple graph. For $v \in V(G)$, the degree of v in G, denoted by $d_G(v)$, is the number of edges of G containing v. For $u, v \in V(G)$, if they are contained in some edge, then u is a neighbor of v in G.

A path of length s (from u to v for $u, v \in V(G)$) is an alternating sequence $(v_1, e_1, v_2, e_2, \ldots, v_s, e_s, v_{s+1})$ of distinct vertices and edges (with $u = v_1$ and $v = v_{s+1}$) such that $\{v_i, v_{i+1}\} \subseteq e_i$ for $1 \leq i \leq s$. A cycle of length s is an alternating sequence $(v_1, e_1, v_2, e_2, \ldots, v_s, e_s, v_1)$ of distinct vertices and edges such that $\{v_i, v_{i+1}\} \subseteq e_i$ for $1 \leq i \leq s-1$ and $\{v_s, v_1\} \subseteq e_s$. If there is a path from u to v for any $u, v \in V(G)$, then we say that G is connected. For a

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