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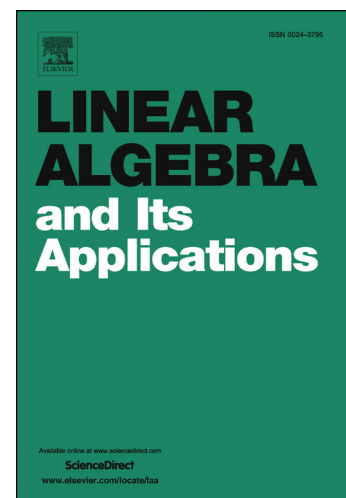
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Graphs with some distance Laplacian eigenvalue of multiplicity $n - 3$

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Abstract: The eigenvalues of the distance Laplacian matrix of a connected graph G are called the distance Laplacian eigenvalues of G . Denote by $\mathcal{G}(n, n - 3)$ the set of all connected graphs on n vertices with some distance Laplacian eigenvalue of multiplicity $n - 3$. In this paper, all graphs belonging to $\mathcal{G}(n, n - 3)$ are characterized completely, which solves the remaining problems in [Rosário Fernandes, Maria Aguiéiras A. de Freitas, Celso M. da Silva Jr., Renata R. Del-Vecchio, Multiplicities of distance Laplacian eigenvalues and forbidden subgraphs, Linear Algebra Appl. 541(2018) 81-93].

Keywords: Distance Laplacian matrix; Distance Laplacian eigenvalues; Multiplicities of eigenvalues

AMS classification: 05C50; 15A18

1 Introduction

Characterizing graphs with few distinct eigenvalues is an attractive topic in graph theory and matrix analysis. Graphs with few (especially, three) distinct adjacency or Laplacian eigenvalues have been deeply investigated (see [1–7] for details). It is revealed that those graphs have nice combinatorial properties. However, it is not easy to give a full characterization of those graphs. Therefore, finding more families of graphs with few distinct eigenvalues is feasible and interesting.

The distance Laplacian matrix of a connected simple graph G , introduced by Aouchiche and Hansen [8], is defined as $\mathcal{L}(G) = \text{diag}(Tr) - \mathcal{D}(G)$, where $\mathcal{D}(G)$ and $\text{diag}(Tr)$ denote the distance matrix of G and a diagonal matrix of the vertex transmissions of G , respectively. The eigenvalues of $\mathcal{L}(G)$ are called the distance Laplacian eigenvalues of G . Since the distance Laplacian matrix was posed, many papers have focused on it (see [9, 10] for examples).

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