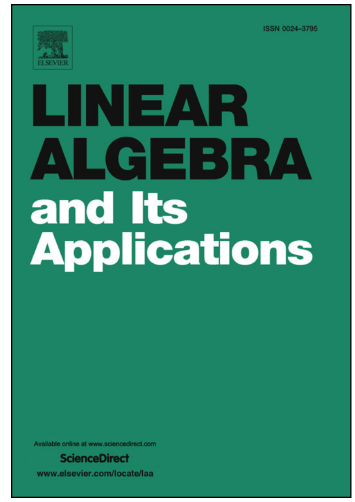
Accepted Manuscript



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PII: S0024-3795(17)30158-1
DOI: http://dx.doi.org/10.1016/j.laa.2017.03.006
Reference: LAA 14082

To appear in: *Linear Algebra and its Applications*

Received date: 9 September 2016
Accepted date: 7 March 2017

Please cite this article in press as: L. Feng et al., Spectral conditions for some graphical properties, *Linear Algebra Appl.* (2017), http://dx.doi.org/10.1016/j.laa.2017.03.006

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March 9, 2017

Abstract

By a unified approach, we present sufficient conditions based on spectral radius for a graph to be k-connected, k-edge-connected, k-Hamiltonian, k-edge-Hamiltonian, β-deficient and k-path-coverable.

Key words: Spectral radius; degree sequence; stability; graph properties.

1 Introduction

Let G be a graph with vertex set $V(G)$, edge set $E(G)$, order $n = |V(G)|$, and size $e(G) = |E(G)|$. For disjoint subsets $A, B \subset V(G)$, we let $e(A, B)$ denote the number of edges of G with one end-vertex in A and the other in B. Let $d_G(v)$ be the degree of a vertex v in G, and let $\delta(G)$ be the minimum degree of G. We use G^c to denote the complement of G, and K_n, E_n the complete graph and the empty graph of order n, respectively. Let $K_{s,t}$ denote the complete bipartite graph whose partition classes have orders s and t. In particular, $K_{1,t}$ denotes the star graph with t edges. An (α, β)*-biregular graph* is a bipartite graph with bipartition $A \cup B$, where all vertices of A have degree α, and all vertices of B have degree β. For two vertex-disjoint graphs G and H, we use $G \cup H$ and $G \vee H$ to denote the disjoint union and the join of G and H, respectively.

The *adjacency matrix* of G is $A(G) = (a_{ij})_{n\times n}$, whose entries satisfy $a_{ij} = 1$ if two vertices i and j are adjacent in G, and $a_{ij} = 0$ otherwise. The *characteristic polynomial* of G is $P_G(x) = \det(xI - A(G))$, and the *eigenvalues* of G are the roots of $P_G(x)$ (with multiplicities). Since $A(G)$ is a symmetric matrix, the eigenvalues of G are real. The largest eigenvalue of G is called the *spectral radius* of G and is denoted by $\lambda(G)$.

The study of the relationship between graph properties and eigenvalues has attracted much attention. This is largely due to the following problem of Brualdi and Solheid [7]: *Given a set $\mathcal{G}$ of graphs, find an upper bound for the spectral radii of the graphs of $\mathcal{G}$, and characterize the graphs for which the maximal spectral radius is attained.* This problem is

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