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On some graphs which satisfy reciprocal eigenvalue properties

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Abstract

We consider only simple graphs. Consider connected bipartite graphs with unique perfect matchings such that the graph obtained by contracting all matching edges is also bipartite. On the class \mathcal{H}_g of such graphs G the equivalence of the following statements are known.

- i) The reciprocal of the spectral radius of the adjacency matrix $A(G)$ is the least positive eigenvalue of the adjacency matrix.
- ii) The graph is isomorphic to its inverse, where the inverse of a graph G is the unique weighted graph whose adjacency matrix is similar to the inverse of the adjacency matrix $A(G)$ via a diagonal matrix of ± 1 s.
- iii) The graph has the reciprocal eigenvalue property, that is, the reciprocal of each eigenvalue of the adjacency matrix $A(G)$ is also an eigenvalue of $A(G)$.
- iv) The graph has the strong reciprocal eigenvalue property, that is, the reciprocal of each eigenvalue of the adjacency matrix $A(G)$ is also an eigenvalue of $A(G)$ and they both have the same multiplicities.
- v) The graph is a corona graph, that is, it is obtained by taking a bipartite graph and then by inserting a new adjacent vertex of degree one at each vertex.

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