

Graph Eigenvalues in Combinatorial Optimization

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Abstract

A number of remarkable spectral properties of graphs are surveyed and a few additional ones are introduced. Several applications in combinatorial optimization are emphasized. Namely, spectral bounds on the clique number, stability number, and chromatic number of graphs are analyzed and spectral graph tools for deciding about the existence of particular combinatorial structures (as it is the case of perfect matchings, dominating induced matchings and Hamilton cycles) are presented. Conversely, cases where the graph eigenvalues can be determined from the combinatorial structure of the graph are explored.

Keywords: graph spectra, combinatorial optimization.