

Eigenvalue bounds for the independence and chromatic number of graph powers and their applications

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Spectral graph theory looks at the connection between the eigenvalues of a matrix associated with a graph and the corresponding structures of a graph. In this talk we will show how spectral methods provide a handy tool for obtaining results concerning the structure of graphs. In particular, we will derive eigenvalue bounds on several NP-hard distance-type graph parameters such as the independence number and the distance chromatic number of graph powers (where the k -th graph power is a graph which has the same vertex set as the original graph G , with two vertices adjacent if and only if they are at distance at most k in G). We will see how to use polynomials and mixed integer linear programming in order to optimize such bounds. Finally we will present some applications to coding theory.