

An Invitation to Spectral Graph Theory: The Laplacian eigenvalues of graphs

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Abstract

Spectral graph theory is a branch of graph theory that studies the connection between the properties of a graph and the eigenvalues and eigenvectors of matrices associated with the graph, such as the adjacency matrix and the Laplacian matrix. The Laplacian matrix of a graph is defined as the difference between the degree matrix and the adjacency matrix of the graph. In addition, its eigenvalues are referred to as Laplacian eigenvalues. Since the Laplacian matrix contains information on the structure of the graph, it has been applied in various fields, including chemistry, physics, and network theory. In this talk, we start with introducing the basic properties of the Laplacian matrices of graphs. Then, we provide a survey of known results on the Laplacian eigenvalues associated with the graphs.