

## DOCTORAL THESIS

### Spectral radius and signless Laplacian spectral radius of $k$ -connected graphs

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# Abstract

The adjacency matrix of a graph is a  $(0, 1)$ -matrix indexed by the vertex set of the graph. And the signless Laplacian matrix of a graph is the sum of its adjacency matrix and its diagonal matrix of vertex degrees. The eigenvalues and the signless Laplacian eigenvalues of a graph are the eigenvalues of the adjacency matrix and the signless Laplacian matrix, respectively. These two matrices of a graph have been studied for several decades since they have been applied to many research fields, such as computer science, communication network, information science and so on.

In this thesis, we study  $k$ -connected graphs and focus on their spectral radius and signless Laplacian spectral radius. Firstly, we determine the graphs with maximum spectral radius among all  $k$ -connected graphs of fixed order with given diameter. As we know, when a graph is regular, its spectral radius and signless Laplacian spectral radius can easily be found. We obtain an upper bound on the signless Laplacian spectral radius of  $k$ -connected irregular graphs. Finally, we give some other results mainly related to the signless Laplacian matrix.

**Keywords:** Irregular graphs; planar graphs;  $k$ -connected; semi-edge walks; adjacency matrix; spectral radius; signless Laplacian matrix; signless Laplacian spectral radius; signless Laplacian characteristic polynomial; coefficient.

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