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On the sum of the two largest eigenvalues of the signless Laplacian matrix

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Let G be a simple graph on n vertices and m edges. Consider $L(G) = D - A$ and $Q(G) = D + A$ as the Laplacian and the signless Laplacian of G, where A is the adjacency matrix and D is the diagonal matrix of the vertices degree of G. Brouwer conjectured that the sum of the k largest Laplacian eigenvalues of G is at most $m + \binom{k+1}{2}$. Haemers *et. al.* [1] proved that this result is valid for $k = 2$. In this paper, we investigate this problem for the signless Laplacian matrix when $k = 1$ and $k = 2$.

Keywords: largest eigenvalues, sum of eigenvalues, signless Laplacian matrix.

References

[1] W.H. Haemers, A. Mohammadian, B. Tayfeh-Rezaie, On the sum of Laplacian eigenvalues of graphs, *Linear Algebra Appl.* **432** (2010), 2214-2221.