

The sum of largest eigenvalues of graphs and matrices

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Gernert conjectured that the sum of two largest eigenvalues of the adjacency matrix of a simple graph of order n is at most n . This can be proved, in particular, for all regular graphs. Gernert's conjecture was disproved by Nikiforov, who also provided a nontrivial upper bound for the sum of two largest eigenvalues. We will present improvements and extensions of these results to general symmetric $n \times n$ matrices and discuss extremal cases. Other recent results on the extreme behavior of the sum the k largest eigenvalues of symmetric matrices and, in particular, adjacency matrices of graphs will also be presented.