On Laplacian Eigenvalues of a Graph

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Let G be a connected graph with n vertices and m edges. The Laplacian eigenvalues are denoted by $\mu_1(G) \geq \mu_2(G) \geq \cdots \geq \mu_{n-1}(G) > \mu_n(G) = 0$. The Laplacian eigenvalues have important applications in theoretical chemistry. We present upper bounds for $\mu_1(G) + \cdots + \mu_k(G)$ and lower bounds for $\mu_{n-1}(G) + \cdots + \mu_{n-k}(G)$ in terms of n and m, where $1 \leq k \leq n-2$, and characterize the extremal cases. We also discuss a type of upper bounds for $\mu_1(G)$ in terms of degree and 2-degree.

Key words: Laplacian Eigenvalue; Line Graph; Bipartite Graph.