# Recent developments on Laplacian energy of graphs

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Let $G(V, E)$ be a simple graph with $n$ vertices and $m$ edges having vertex set $V(G) = \{v_1, v_2, \dots, v_n\}$ and edge set $E(G) = \{e_1, e_2, \dots, e_m\}$. The adjacency matrix $A = (a_{ij})$ of $G$ is a $(0, 1)$-square matrix of order $n$ whose $(i, j)$-entry is equal to 1, if $v_i$ is adjacent to $v_j$ and equal to 0, otherwise. Let $D(G) = diag(d_1, d_2, \dots, d_n)$ be the diagonal matrix associated to $G$, where $d_i = \deg(v_i)$, for all $i = 1, 2, \dots, n$. The matrix $L(G) = D(G) - A(G)$ is called the Laplacian matrix and its spectrum is called the Laplacian spectrum ($L$-spectrum) of the graph $G$. Being a real symmetric, positive semi-definite matrix, we take $0 = \mu_n \le \mu_{n-1} \le \dots \le \mu_1$ to be the $L$-spectrum of $G$. The Laplacian energy of a graph $G$ as put forward by Gutman and Zhou [3] is defined as

$$LE(G) = \sum_{i=1}^{n} |\mu_i - \frac{2m}{n}|.$$

The motivation for Laplacian energy comes from graph energy [1, 2, 4]. This quantity, which is an extension of graph-energy concept, has found remarkable chemical applications beyond the molecular orbital theory of conjugated molecules see [5]. Laplacian graph energy is a broad measure of graph complexity. Song et al. [6] introduced component-wise Laplacian graph energy, as a complexity measure useful to filter image description hierarchies.

In this talk, we discuss the recent developments on the Laplacian energy of graphs.

## References

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