On irregularity indices and main eigenvalues of graphs and their applicability

Amina Arif*, COMSATS University Islamabad, Sahiwal Campus, Pakistan,
Sakander Hayat, Universiti Brunei Darsussalam,
Asad Khan, Guangzhou University, P.R.China,

Graph-theoretic irregularity indices have diverse applications in computer science. This talk extends their practical applicability in reticular chemistry. First, we put forward a method of computing various irregularity indices of graphs by means of their main eigenvalues. This presents applications of spectral graph theory in chemistry. We find parametric conditions for which the generalized friendship graphs, the join of two regular graphs, the corona of two regular graphs and the vertex-deleted subgraph of a strongly regular graph have exactly two distinct main eigenvalues. By computing the two main eigenvalues for these classes of graphs, we determine their certain irregularity indices. Our results generalize most of the results of Réti [*Appl. Math. Comp.*, 344- 345 (2019) 107115], in which the author studied these irregularity indices for the complete bipartite graphs, friendship graphs and complete split graphs. More importantly, we prove a conjecture proposed in Réti [*Appl. Math. Comp.*, 344-345 (2019) 107115] stating that the complete split-like graphs have exactly two distinct main eigenvalues.

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