

Some extremal value problems of vertex-degree-based invariants on trees and connected graphs

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Abstract. A collection of innovative vertex-degree-based invariants, including Sombor–Index–Like Graph Invariants denoted as SO_i for $1 \leq i \leq 6$, and generalized reduced Zagreb indices represented as GRM_λ for certain $\lambda \in \mathbf{R}$, was recently introduced. These invariants were developed through geometric reasoning within a novel graph invariant framework. Motivated by unresolved questions and ongoing findings highlighted in [1] and [2], we determined the maximum values of SO_5 and SO_6 , as well as the minimum value of GRM_λ for $\lambda \leq -2$, in specific classes of trees with predefined order and maximal degree (such as molecular trees with maximal degrees of 3 and 4). Furthermore, we identified the maximum value of SO_5 among the graphs resulting from applying the join operation to specific graphs of a given order.

Keywords: Vertex-degree-based invariants; Trees; Extremal values.

References

- [1] **Z. Tang, Q. Li, H. Deng.** Trees with Extremal Values of the Sombor–Index–Like Graph Invariants. *MATCH Commun. Math. Comput. Chem.*, 2023, 90, 203 - 222.
- [2] **N. Dehgard, S. Klavžar.** Improved lower bounds on the general reduced second Zagreb index of trees. <https://users.fmf.uni-lj.si/klavzar/preprints/general-RSZI-9>, 2023, to appear.