

On the Sombor Index and Its Variants in Powers of Cycle Graphs

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Abstract

The Sombor index and its related variants—such as the Reduced Sombor Index, Average Sombor Index, Sombor coindex, First Zagreb–Sombor Index, and Second Zagreb–Sombor Index—have recently gained attention as important degree-based descriptors in chemical graph theory, biological network analysis, and engineered systems. In this work, we investigate these indices for different powers of cycle graphs and derive their corresponding closed-form expressions. Our analysis reveals that the values of these indices are significantly affected by the power of the underlying graph. We conclude the paper with several open problems and potential directions for future research.

Keywords— Sombor index, Reduced Sombor index, Average Sombor index, Sombor coindex, Zagreb index, Graph powers

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