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TECHNICAL REPORT

WIENER AND ECCENTRIC CONNECTIVITY INDICES OF THE POWER GRAPH ASSOCIATED TO DIHEDRAL GROUPS OF ORDER AT MOST 16

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ABSTRACT

Topological indices correlate chemical structure with physical and chemical attributes, offering insights into reactivity and biological activity. They have diverse applications in Quantitative Structure-Activity Relationship (QSAR), Quantitative Structure-Property Relationship (QSPR), pharmacological drug design, and species classification. Wiener index measures the shortest-path distances between all pairs of vertices, while eccentric connectivity index combines the eccentricity and degree of each vertex in a graph. In addition, the power graph is defined as a graph whose vertex set is all the elements of a group and two distinct vertices are adjacent if and only if one is the power of the other. In this study, the power graph associated with the dihedral groups of order at most 16 are constructed. Then, the Wiener and eccentric connectivity indices are computed by using their definitions. The properties of the dihedral groups and its power graphs are also investigated. Topological indices, derived from molecular graphs, have diverse applications in structural chemistry and benefit from graph theory methods. Predicting physicochemical properties used to require laboratory work, but now mathematical approaches allow quick and cost-effective computation of topological indices. The study highlights a notable gap in previous studies regarding the determination of topological indices of graphs related to groups. It describes a study where graphs of groups are constructed, and their properties, such as vertex degrees and distances, are examined. Finally, the topological indices of these graphs are calculated. Hence, this study found the Wiener index and eccentric connectivity index increases as the order of the group increases.