



GEOMETRIC ARITHMETIC STATUS INDEX OF GRAPHS

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ABSTRACT

The status of a vertex u in a connected graph G , denoted by $\sigma(u)$ is defined as the sum of the distance between u and all other vertices of a graph G . In this paper we have defined geometric arithmetic status (GAS) index of a graph and obtained the bounds for it. Further geometric arithmetic status index of some graphs are obtained. Also the regression analysis of the boiling point of Paraffin with GAS index is carried out.

Keywords: Distance, status, diameter, geometric arithmetic status index.

AMS Subject Classification: 05C12, 05C90.

1. INTRODUCTION

In theoretical chemistry, the graph theoretic models can be used to study the properties of molecules. One of the known graph parameter is the Wiener index which was used to study the chemical properties of paraffin's [3]. Many distance based indices of a graph, such as status connectivity indices [4], Zagreb indices [7, 8], Wiener index [6] and Geometric arithmetic index [1] have been appeared in the literature. In this paper we introduce and study the new index called geometric arithmetic status (GAS) index. Let G be a connected graph with n vertices and m edges. Let $V(G)$ and $E(G)$ be its vertex and edge sets, respectively. The distance between the vertex u and v is the length of the shortest path joining u and v and is denoted by $d_G(u, v)$

The status of a vertex $u \in V(G)$ denoted by $\sigma_G(u)$ is defined as [2],

$$\sigma_G(u) = \sum_{v \in V(G)} d(u, v).$$

The Wiener index $W(G)$ of a connected graph G is defined as [6].

$$W(G) = \sum_{\{u,v\} \subseteq V(G)} d_G(u, v) = \frac{1}{2} \sum_{v \in V(G)} \sigma_G(v).$$

In [1], Vukičević *et al.* defined a new topological index "geometric arithmetic index" of a graph G denoted by $GA(G)$ and is defined by,

$$GA(G) = \sum_{uv \in E(G)} \frac{2\sqrt{d_u d_v}}{d_u + d_v}$$

Inspired by this definition, we define here geometric arithmetic status index of a connected graph G as,

$$GAS(G) = \sum_{uv \in E(G)} \frac{2\sqrt{\sigma_u \sigma_v}}{\sigma_u + \sigma_v}.$$

2. RESULTS

In this paper, we obtain the bounds for the geometric arithmetic status index. Also we obtain the geometric arithmetic status index of some graphs. Further the correlation between the boiling point of paraffin's and geometric arithmetic status index of the corresponding molecular graph is studied.

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