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OPEN PROBLEMS ON ONE PHYSICO-CHEMICAL INDEX OF ELECTRICAL NETWORKS

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Abstract

The general sum atom-bond connectivity indices of networks are very important and there are more application in physico-chemical science and vice versa. In this paper, many conclusions on some electrical networks are summarized and relevant open problems are raised.

Keywords: physico-chemical index, general sum atom-bond connectivity index, electrical networks.

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1. Introduction

In physico-chemical science, many physico-chemical properties of alkanes and hydrocarbons play the most important role on their different applications, such as boiling points, chromatographic detection times, enthalpies of formation, parameters in Antoine equation for vapour pressure, surface areas.

Let $G = (V, E)$ be a simple finite molecular graph with the vertex set $V(G)$ and the edge set $E(G)$. In physico-chemical graph theory, the vertices and the edges correspond to the atoms and the bonds, respectively. All other notation and terminology are referred to [1].

As we know, the first Zagreb index has been introduced more than forty years ago by Gutman and Trinajestic ([2, 3]), which is defined as

$$M_1(G) = \sum_{x \in V(G)} d(x) = \sum_{uv \in E(G)} (d_u + d_v).$$

Latter the sum-connectivity index of the graph G, denoted by $\chi(G)$, is defined as [4]

$$\chi(G) = \sum_{uv \in E(G)} (d_u d_v)^{-\frac{1}{2}}.$$

Recently, a closely related variant of Randić connectivity index called the sum-connectivity index was introduced by Zhou and Trinajestic [5] in 2008. The general sum-connectivity index $\chi_\alpha(G)$ is defined as

$$\chi_\alpha(G) = \sum_{uv \in E(G)} (d_u + d_v)^\alpha.$$

The general sum-connectivity index generalized both the ordinary sum-connectivity index and the first Zagreb index, and in [10], the authors gave some basic properties about the general sum-connectivity index.

2. Open Problems

According to the definitions of electrical networks, it is difficult to determine their general sum-connectivity index $\chi_\alpha(G)$. Even we know all topological properties of the electrical networks, their general sum-connectivity indices are very important and it is hard to obtain for us. These questions below are still open.

Problem 1. Characterize all topological properties of electrical networks.

Problem 2. How to determine the general sum-connectivity indices of electrical networks.

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