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Research Article

More on the bounds for the skew Laplacian energy of weighted digraphs

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Abstract: Let $\mathscr{D}$ be a simple connected digraph with n vertices and m arcs and let $W(\mathscr{D}) = (\mathscr{D}, w)$ be the weighted digraph corresponding to $\mathscr{D}$, where the weights are taken from the set of non-zero real numbers. Let $\nu_1, \nu_2, \ldots, \nu_n$ be the eigenvalues of the skew Laplacian weighted matrix $\widetilde{SLW}(\mathscr{D})$ of the weighted digraph $W(\mathscr{D})$. In this paper, we discuss the skew Laplacian energy $\widetilde{SLEW}(\mathscr{D})$ of weighted digraphs and obtain the skew Laplacian energy of the weighted star $W(\mathscr{K}_{1,n})$ for some fixed orientation to the weighted arcs. We obtain lower and upper bounds for $\widetilde{SLEW}(\mathscr{D})$ and show the existence of weighted digraphs attaining these bounds.

Keywords: Weighted digraph, skew Laplacian matrix of weighted digraphs, skew Laplacian energy of weighted digraphs

AMS Subject classification: 05C30, 05C50

1. Introduction

A weighted digraph $W(\mathscr{D})$(or a weighted network) is defined to be an ordered pair $(\mathscr{D}^u, w)$, where $\mathscr{D}^u = (V, \mathscr{A})$ is the underlying digraph of $W(\mathscr{D})$ and $w : \mathscr{A} \to \mathbb{R} - \{0\}$ is the weight function. Weight of any arc $e = (u, v)$ is denoted by $w(e)$. Every digraph can be regarded as the weighted digraph with weight of each arc equal to one.

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