Summary: The skew energy of an oriented graph $G^\sigma$, denoted by $E_s(G^\sigma)$, is defined as the sum of the singular values of its skew adjacency matrix $S(G^\sigma)$. The connected $k$-regular oriented graph on $n$ vertices having skew energy $\sqrt{kn}$ is called the optimum skew energy $k$-regular oriented graph. In this paper, we determine the 4-regular graphs $G$ such that each of them has an orientation $\sigma$ satisfying $G^\sigma$ which is an optimum skew energy oriented graph. In addition, as by-product we obtain a method to construct optimum skew energy $k$-regular oriented graphs with large order.

Keywords: skew energy of an oriented graph; 4-regular graphs

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