SQUARE ROOTS OF DOUBLY REGULAR TOURNAMENT MATRICES∗

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Abstract. Fletcher asked whether there is a (0, 1)-matrix of order greater than 3 whose square is a regular tournament matrix. We give a negative answer for a special class of regular tournament matrices: There is no (0, 1)-matrix of order greater than 3 whose square is a doubly regular tournament matrix.

Key words. Tournament matrix, Matrix square root, Doubly regular tournament

AMS subject classifications. 05C50, 05C20, 15B36.

Abstract. Given a graph and a vector defined on the graph, a quadratic form is defined on the graph depending on its edges. In order to minimize the quadratic form on trees or unicyclic graphs associated with signless Laplacian, the notion of basic edge set of a graph is introduced, and the behavior of the least eigenvalue and the corresponding eigenvectors is investigated. Using these results a characterization of the unique bicyclic graph whose least eigenvalue attains the minimum among all non-bipartite bicyclic graphs of fixed order is obtained.

Key words. Graph, Bicyclic graph, Quadratic form, Least eigenvalue, Signless Laplacian.

AMS subject classifications. 05C50, 15A18.

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