Original Articles

The S～2NS Digraphs and the Cycle Linear System of a Digraph

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摘要　　It is known that the study of the qualitative properties of a matrix A (which depend only on the sign pattern of A) can be turned into the study of the graph theoretical properties of the signed digraph S(A). The underlying digraph of the signed digraph of a strong sign nonsingular matrix (abbreviated S~2NS matrix) with a negative main diagonal is called an S~2NS digraph. In the study of S~2NS digraphs, the minimal forbidden configuration (or MFC for short) plays an important role. Three (classes of) MFS's were constructed by Thomassen, Brualdi and Shader, and Shao. In this paper, we show that a digraph D is an S2NS digraph if and only if its "cycle linear system" is solvable. This simplifies a parallel result obtained by Shao and Hu. As an application of the result, a graph theoretical characterization for a digraph to be an S~2NS digraph is given. At the end of the paper, we construct infinitely many new MFCs to show that for each even number k (k>0), there are basic MFCs with k terminal components (here, with no loss of generality, we assume that the number of the initial components of a digraph is no less than that of its terminal components throughout the following).

关键词　　Matrix, S~2 NS digraph, Cycle linear system

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