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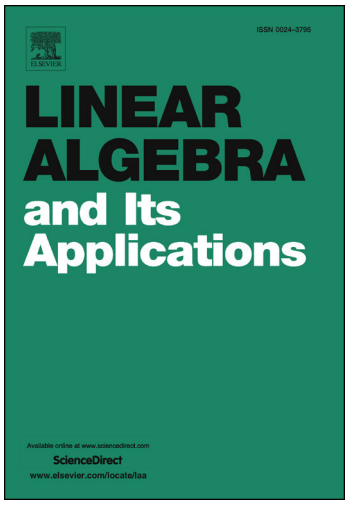

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Minimal Matrices in the Bruhat Order for Symmetric $(0,1)$-Matrices

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Abstract

In this paper we study the minimal matrices for the Bruhat order on the class of symmetric $(0,1)$-matrices with given row sum vector. We will show that, when restricted to the symmetric matrices, new minimal matrices may appear besides the symmetric matrices for the nonrestricted Bruhat order. We modify the algorithm presented by Brualdi and Hwang (2004), which gives a minimal matrix for the Bruhat order on the class of $(0,1)$-matrices with given row and column sum vectors, in order to obtain a minimal matrix for the Bruhat order on the class of symmetric $(0,1)$-matrices with given row sum vector. We identify other minimal matrices in some of these classes. Namely, we determine all the minimal matrices when the row sums are constant and equal to 3. We then describe a family of symmetric matrices that are minimal for the Bruhat order on the class of $2k$-by-$2k$ $(0,1)$-matrices with constant row sums equal to $k+1$ and identify, in terms of the term rank of a matrix, a class of symmetric

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