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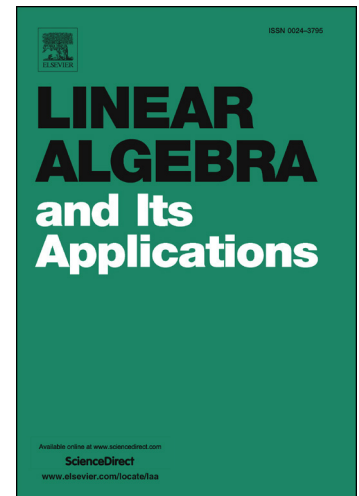
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Products of symplectic normal matrices

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Abstract

A matrix $A \in M_{2n}(\mathbb{C})$ is *symplectic* if $A^T \begin{bmatrix} 0 & I_n \\ -I_n & 0 \end{bmatrix} A = \begin{bmatrix} 0 & I_n \\ -I_n & 0 \end{bmatrix}$. We show that every symplectic matrix is a product of a symplectic unitary and a symplectic skew-Hermitian matrix. We show that every symplectic matrix is a product of four symplectic skew-Hermitian matrices or a product of four symplectic Hermitian matrices. We give the possible Jordan canonical forms of symplectic matrices which can be written as a product of a symplectic Hermitian and a matrix which is either symplectic Hermitian or symplectic skew-Hermitian.

MSC: 15A21, 15A23

Keywords: symplectic, Hermitian, skew-Hermitian, unitary, decompositions

1 Introduction

A lot of work has been done in expressing matrices and operators as products whose factors have “nice” properties. The set of normal matrices is an

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