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ON THE mth ROOTS OF A COMPLEX MATRIX*

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Abstract. If an $n \times n$ complex matrix A is nonsingular, then for every integer $m > 1$, A has an mth root B, i.e., $B^m = A$. In this paper, we present a new simple proof for the Jordan canonical form of the root B. Moreover, a necessary and sufficient condition for the existence of mth roots of a singular complex matrix A is obtained. This condition is in terms of the dimensions of the null spaces of the powers A^k $(k = 0, 1, 2, \ldots)$.

Key words. Ascent sequence, eigenvalue, eigenvector, Jordan matrix, matrix root.

AMS subject classifications. 15A18, 15A21, 15A22, 47A56

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