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ON GRADED QR DECOMPOSITIONS OF PRODUCTS OF MATRICES *

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Abstract. This paper is concerned with the singular values and vectors of a product $M_m = A_1 A_2 \cdots A_m$ of matrices of order n. The chief difficulty with computing them directly from M_m is that with increasing m the ratio of the small to the large singular values of M_m may fall below the rounding unit, so that the former are computed inaccurately. The solution proposed here is to compute recursively the factorization $M_m = QRP^{\mathrm{T}}$, where Q is orthogonal, R is a graded upper triangular, and P^{T} is a permutation.

Key words. QR decomposition, singular value decomposition, graded matrix, matrix product.

AMS subject classification. 65F30.

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