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NUMERICAL METHODS FOR THE COMPUTATION OF ANALYTIC SINGULAR VALUE DECOMPOSITIONS *

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Dedicated to Wilhelm Niethammer on the occasion of his 60th birthday.

Abstract. An analytic singular value decomposition (ASVD) of a path of matrices $E(t)$ is an analytic path of factorizations $E(t) = X(t)S(t)Y(t)^T$ where $X(t)$ and $Y(t)$ are orthogonal and $S(t)$ is diagonal. The diagonal entries of $S(t)$ are allowed to be either positive or negative and to appear in any order. For an analytic path matrix $E(t)$ an ASVD exists, but this ASVD is not unique. We present two new numerical methods for the computation of unique ASVD's. One is based on a completely algebraic approach and the other on one step methods for ordinary differential equations in combination with projections into the set of orthogonal matrices.

Key words. analytic singular value decomposition, singular value decomposition.

AMS subject classification. 65F25.

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