The Electronic Journal of Linear Algebra.
A publication of the International Linear Algebra Society.
Volume 8, pp. 26-46, March 2001.
ISSN 1081-3810. http://math.technion.ac.il/iic/ela

ELA

MINIMAL DISTORTION PROBLEMS FOR CLASSES OF UNITARY MATRICES*

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Abstract. Given two chains of subspaces in $\mathbb{C}^n$, the set of those unitary matrices is studied that map the subspaces in the first chain onto the corresponding subspaces in the second chain, and minimize the value $\|\mathbf{U} - I_n\|$ for various unitarily invariant norms $\| \cdot \|$ on $\mathbb{C}^{n\times n}$. In particular, a formula for the minimum value $\|\mathbf{U} - I_n\|$ is given, and the set of all the unitary matrices in the set attaining the minimum is described, for the Frobenius norm. For other unitarily invariant norms, the results are obtained if the subspaces have special structure. Several related matrix minimization problems are also considered.

Key words. Unitary matrix, matrix optimization.

AMS subject classifications. 15A99.

*Received by the editors on 5 November 2000. Accepted for publication on 27 February 2001. Handling Editor: Ravindra B. Bapat.

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