Singular value estimates for matrices with small displacement rank

Bernhard Beckermann
Laboratoire Painlev (ANO-EDP)
Universit de Lille 1, F-59655 Villeneuve d'Ascq
email: Bernhard.Beckermann@univ-lille1.fr

September 16, 2004

In this talk we will discuss the condition number and more generally ratios of singular values of matrices X which have the property that, for given normal matrices A and B, the rank of $AX - XB$ is small compared to the dimension of the matrix. This includes Vandermonde, Cauchy, Krylov, Loewner and many other classes of structured matrices. We propose an estimate of these ratios in terms of the solution of the third Zolotarev problem with respect to the spectra of A and B. In a second Theorem, we propose an improved estimate for $A = A$ and hermitian X, including for instance (block) Hankel matrices. Several examples illustrate the sharpness of the proposed bounds.