

Structured Condition Numbers for Eigenvalues and Invariant Subspaces

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This talk gives an overview of recent work on structured condition numbers for eigenvalues and invariant subspaces. Standard condition numbers may severely overestimate the effect of perturbations on the accuracy if the perturbations are known to be structured. Such a situation occurs, for example, when a strongly backward stable method is applied to compute the eigenvalues of a structured matrix. In the first part of this presentation we focus on structures that form Jordan algebras, Lie algebras, or Lie groups associated with a bilinear form, which includes the classes of orthogonal, symplectic and Hamiltonian matrices. It will be shown that these structures often admit particularly simple expressions for the structured eigenvalue condition number. In the second part we present a recently developed framework for deriving structured condition numbers for invariant subspaces whose Sylvester operator decomposes orthogonally with respect to the structure.