Banded Toeplitz structured eigensensitivity

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Abstract

The sensitivity of the spectrum of a matrix under general or structured perturbations of the matrix entries has received attention in the literature, and both bounds and graphical tools such as the pseudospectrum or structured pseudospectrum have been developed. Also, characterizations of the algebraic variety of normal matrices and distance measures to this variety have received considerable attention. It is the purpose of my talk to carry out an investigation that focuses on analyzing the eigensensitivity of a banded Toeplitz matrix in relation to its distance to normality and to the structure of the perturbations to which it is subjected. Also, the distance of a banded Toeplitz matrix to the variety of similarly structured positive semidefinite matrices will be taken into account. In order to illustrate explicit expressions for the conditioning of eigenvalues and eigenvectors as well as algorithms for the construction of approximate structured pseudospectra, I will focus on the special case of the tridiagonal matrices, whose eigenvalues and eigenvectors are known in closed form.
(Joint work with Lothar Reichel)