A Schur-Based Algorithm to Compute the Smallest Eigenvalue of Symmetric Positive Definite Toeplitz Matrices

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The problem of computing the smallest eigenvalue and corresponding eigenvector of symmetric positive definite Toeplitz matrices is of considerable interest in signal processing. Many of the iterative algorithms developed so far require to compute the solution of a linear system with a Toeplitz coefficient matrix. The latter problem is solved via the Levinson algorithm.

In this talk we describe a completely different approach. Each step of the new iterative algorithm yields a lower approximation of the smallest eigenvalue of the involved symmetric positive definite Toeplitz matrix, relying on the generalized Schur algorithm. The complexity and the numerical results are comparable to those obtained by the other algorithms available in the literature.