ON THE EFFICIENT SOLUTION OF $T$-EVEN POLYNOMIAL EIGENVALUE PROBLEMS

H. Faßbender, and Ph. Saltenberger
ICM, AG Numerik, TU Braunschweig
Universitätsplatz 2, 38106 Braunschweig, Germany
h.fassbender@tu-braunschweig.de

The polynomial eigenvalue problem $A(\lambda)u = 0$ for

$$A(\lambda) = \sum_{k=0}^{d} A_k \lambda^k, \quad A_k \in \mathbb{R}^{n \times n}$$

with $A_k = A_k^T$ if $k$ is even and $A_k = -A_k^T$ otherwise is considered. Such matrix polynomials have been named alternating or $T$-even. The eigenvalues of such matrix polynomials $A(\lambda)$ have a Hamiltonian eigenstructure; that is, the spectrum is symmetric with respect to both the real and the imaginary axis.

We discuss the numerical solution of $T$-even polynomial eigenvalue problems and show how a small part of the spectrum can be obtained using just $O(n^3)$ arithmetic operations. For that purpose, we apply the EVEN-IRA algorithm proposed in [2] to a special structure-preserving linearization proposed in [1]. In this particular situation, the Arnoldi iteration as a main part of the EVEN-IRA algorithm can be realized very efficiently.

References
