

Properties of Perron-Frobenius Matrix Polynomials

K.-H. Förster, N. Hartanto

In this talk we consider spectral properties of Perron-Frobenius matrix polynomials, i.e. polynomials of the type

$$\lambda^m - (\lambda^l A_l + \cdots + \lambda A_1 + A_0),$$

where the coefficients A_j are entrywise nonnegative square matrices. Essential for the investigation of these properties is the log-log convexity of the function

$$[0, \infty) \rightarrow [0, \infty) \quad \text{with} \quad \rho \mapsto \text{spectral radius of } \rho^l A_l + \cdots + A_0.$$

For the case when the sum of the coefficients is irreducible we prove an analogue of the well known result of the peripheral eigenvalues for nonnegative irreducible matrices.

Polynomials of this type with $m < l$ are equivalent to

$$\lambda - (\lambda^{l-m} \tilde{A}_{l-m} + \cdots + \tilde{A}_0),$$

therefore we can reduce in this case our investigations to polynomials of the latter type.

This is a joint work with B. Nagy (Technical University Budapest).