Some Ideas for the Computation of Matrix Solvents

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Abstract

We consider the matrix polynomial $P(\lambda) = \sum_{i=0}^{\ell} A_i \lambda^i$, with given coefficients $A_i \in \mathbb{C}^{n\times n}$. A matrix $S \in \mathbb{C}^{n\times n}$ is called a solvent if $P(S) = 0$. We explore some approaches to the symbolic and numeric computation of solvents. In particular, we compute formulas for the condition number and backward error of the problem which rely on the contour integral based representation of $P(S)$. Finally, we describe a possible approach for computing exact solvents symbolically.