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Orthogonal polynomial expansions for the matrix exponential. (English) Zbl 1217.65078

Summary: Many different algorithms have been suggested for computing the matrix exponential. In this paper, we put forward the idea of expanding in either Chebyshev, Legendre or Laguerre orthogonal polynomials. In order for these expansions to converge quickly, we cluster the eigenvalues into diagonal blocks and accelerate using shifting and scaling.

MSC:
65F30 Other matrix algorithms (MSC2010)
15A16 Matrix exponential and similar functions of matrices

Keywords:
matrix exponential; Chebyshev polynomial; Legendre polynomial; Laguerre polynomial; algorithms; eigenvalues; scaling

Software:
MATLAB expm; OPQ; Expokit

Full Text: DOI

References:
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