Rimas, Jonas

Explicit expression for powers of tridiagonal 2-Toeplitz matrix of odd order.  (English)

Linear Algebra Appl. 436, No. 9, 3493-3506 (2012).

Let $B$ be a tridiagonal 2-Toeplitz matrix of odd order. That is, the main diagonal of $B$ is of the form $(a_1, a_2, \ldots, a_1, a_2, a_1)$, the first diagonals above and below it are $(b_1, b_2, \ldots, b_1, b_2)$ and $(c_1, c_2, \ldots, c_1, c_2)$ respectively, and all other entries are zero. Making use of results due to M. J. C. Gover [Linear Algebra Appl. 197–198, 63–78 (1994; Zbl 0833.15009)], the author presents the eigenvalue decomposition of $B$ and gives an expression for $B^l$, where $l$ is a positive integer. His previous works [Appl. Math. Comput. 171, No. 2, 1214–1217 (2005; Zbl 1090.65048); ibid. 174, No. 1, 676–683 (2006; Zbl 1139.65305)] are so extended. The results involve Chebyshev polynomials of the second kind.

Reviewer: Jorma K. Merikoski (Tampere)

MSC:

15A18 Eigenvalues, singular values, and eigenvectors
15B05 Toeplitz, Cauchy, and related matrices

Keywords:

Toeplitz matrices; tridiagonal matrices; matrix powers; eigenvalues; eigenvectors; Chebyshev polynomials

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References:


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