Zygmunt, Marcin J.
Jacobi block matrices with constant matrix terms. (English) [Zbl 1085.47036]

The author studies the matrix difference equation with constant recurrence coefficients

$$xU_{n}^{A,B}(x) = AU_{n+1}^{A,B}(x) + BU_{n}^{A,B}(x) + AU_{n-1}^{A,B}(x), \quad n = 0, 1, \ldots$$

with the boundary conditions $U_{0}^{A,B} = I$, $U_{-1}^{A,B} = 0$, where $A, B$ are Hermitian $N \times N$ matrices. The $U_{n}^{A,B}$ are known as the matrix Chebyshev polynomials of the second kind. Let $W^{A,B}$ be the corresponding matrix orthogonality measure. The author computes its moments and shows that its support

$$\text{supp} W^{A,B} = \bigcup_{t \in [-2, 2]} \sigma(At + B)$$

consists of at most $N$ non-degenerate intervals of the real line. In the case when $A$ is invertible, the measure $W^{A,B}$ is absolutely continuous with respect to the Lebesgue measure.

For the entire collection see [Zbl 1051.47002].

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MSC:

47B36 Jacobi (tridiagonal) operators (matrices) and generalizations

39A70 Difference operators

39B42 Matrix and operator functional equations

Keywords:

Chebyshev polynomials; discrete Schrödinger operators; Jacobi block matrices, matrix orthogonal polynomials