Finite Truncations of Generalized One-Dimensional Discrete Convolution Operators and Asymptotic Behavior of the Spectrum. The Matrix Case

We study the sequence \( \{A_N(a)\}_{N \in \mathbb{N}} \) of finite truncations of a generalized discrete convolution operator, which have matrices of the form

\[
A_N(a) \sim \left( a \left( \frac{n}{E(N)}, \frac{k}{E(N)}, n - k \right) \right)_{n,k=1,\ldots,N},
\]

where \( a \) is some function defined on \([0, +\infty) \times [0, +\infty)\), \( E(\cdot) \) is defined on \( \mathbb{N} \) and \( E(N) \to \infty, \frac{N}{E(N)} \to \infty \) as \( N \to \infty \). For this sequence we get a generalization of the Szegö limit theorem.

**Keywords:** Szegö limit theorem, convolution operator, eigenvalues, Toeplitz operator.

**MSC:** 47B35; 15A18