СОВРЕМЕННЫЕ ПРОБЛЕМЫ АНАЛИЗА И ПРЕПОДАВАНИЯ МАТЕМАТИКИ

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On the spectrum of a generalized difference operator over the sequence space c

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P. Srivastava and S. Kumar [3] introduced the generalized difference operator Δ_v on the sequence space c_0 as follows: $\Delta_v : c_0 \to c_0$ is defined by

$$\Delta_v x = \Delta_v\,(x_n) = (v_n x_n - v_{n-1} x_{n-1}) \text{ with } x_{-1} = 0,$$

where (v_k) is either constant or strictly decreasing sequence of positive real numbers satisfying $\lim_{k\to\infty} v_k = L > 0$ and $v_0 \le 2L$. Also, P. Srivastava and S. Kumar [3] determined the spectrum and the fine spectrum of the operator Δ_v on the sequence space c_0.

In this paper we determine the spectrum of the generalized difference operator Δ_v on the sequence space $l_p, (1 \le p \le \infty)$. The results of our paper not only generalize the corresponding results of [1] and [2] but also give results for some more operators.

By $B(X)$, we denote the set of all bounded linear operators on the Banach space X into itself.

We have the following main result:

Theorem 1.

1. $\Delta_v \in B\,(X)$ with norm $\|\Delta_v\|_c = v_0 + v_1$.
2. $\sigma\,(\Delta_v, c) = \{\alpha \in \mathbb{C} : |\alpha - L| \le L\}$.
3. $\sigma\,(\Delta_v, c)$.

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The Peierls-Bogoliubov inequality in von Neumann algebras and characterization of tracial functionals

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It is an important issue in statistical mechanics to calculate the value of the so-called *partition function* $\mathrm{tr}(e^{\widehat{H}})$, where the Hermitian matrix $\widehat{H}$ is the Hamiltonian of a physical system. Since that computation is often difficult, it is easier to compute the related quantity $\mathrm{tr}(e^H)$, where H is a convenient approximation of the Hamiltonian $\widehat{H}$. Let $\widehat{H} = H + K$. The *Peierls-Bogoliubov inequality* provides useful information on $\mathrm{tr}(e^{H+K})$ from $\mathrm{tr}(e^H)$. This inequlity states that, for two Hermitian operators H and K

$$\mathrm{tr}(e^H)\exp\frac{\mathrm{tr}(e^H K)}{\mathrm{tr}(e^H)} \le \mathrm{tr}(e^{H+K}).$$

A positive linear functional φ on a von Neumann algebra $\mathcal{M}$ is said to be *normal* if $\varphi(\sup A_i) = \sup \varphi(A_i)$ for every bounded increasing net $\{A_i\}$ of positive operators in $\mathcal{M}$; *tracial* if $\varphi(AB) = \varphi(BA)$ for all A, B in $\mathcal{M}$.