

SOME NEW PARANORMED SPACES AND DIFFERENCE OPERATOR ORDER m

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In this work, our goal is to introduce paranormed new sequence spaces defined by using E^r - and Δ^m - transform. We shall use $e_0^r(\Delta^m, p)$, $e_c^r(\Delta^m, p)$ and $e_\infty^r(\Delta^m, p)$ for notation of new sequence spaces. We first give a inclusion theorem between new sequence spaces and we shall study topological structure of these spaces. Afterward the basis and α , β , γ - duals of these spaces will be given. Also we characterize some the matrix classes.

We now introduce the following new sequence spaces:

$$\begin{aligned} e_0^r(\Delta^m, p) &= \{x = (x_k) \in w : (E^r \Delta^m x_k) \in c_0(p)\} \\ e_c^r(\Delta^m, p) &= \{x = (x_k) \in w : (E^r \Delta^m (x_k - l)) \in c(p) \text{ for some } l \in R\} \\ e_\infty^r(\Delta^m, p) &= \{x = (x_k) \in w : (E^r \Delta^m x_k) \in \ell_\infty(p)\} \end{aligned}$$

where $\Delta^m x = (\Delta^m x)_k = \sum_{i=0}^m (-1)^i \binom{m}{i} x_{k-i} = \sum_{i=\max(0, k-m)}^m (-1)^{k-i} \binom{m}{k-i} x_i$.

Theorem 1. The sequence space $e_\infty^r(\Delta^m, p)$ includes the sequence space $e_c^r(\Delta^m, p)$

Theorem 2. The sequence spaces $e_0^r(\Delta^m, p)$, $e_c^r(\Delta^m, p)$ and $e_\infty^r(\Delta^m, p)$ are complete linear metric spaces with paranorm defined by

$$h(x) = \sup_{n \in N} \left| \sum_{k=0}^n \binom{n}{k} (1-r)^{n-k} r^k \Delta^m x_k \right|^{\frac{pn}{M}}.$$

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