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On paranormed λ-sequence spaces of non-absolute type

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ABSTRACT

In this work, we introduce some new generalized sequence spaces related to the spaces $\ell_\infty(p)$, $c(p)$ and $c_0(p)$. Furthermore, we investigate some topological properties such as the completeness and the isomorphism, and we also give some inclusion relations among these sequence spaces. In addition, we compute the α-, β- and γ-duals of these spaces, and characterize certain matrix transformations on these sequence spaces.

1. Introduction

Some basic approaches of studying the sequence spaces are inclusion relations, matrix mapping, and the determination of topologies which are completeness, duals (continuous or Köthe–Teoplitz), and bases. To obtain new sequence spaces, in general, the matrix domain μ_A of an infinite matrix A defined by $\mu_A = \{x = (x_k) \in w : Ax \in \mu\}$ is used. In most cases, the new sequence space μ_A generated by the limitation matrix A from a sequence space μ is the expansion or the contraction of the original space μ; in some cases these spaces may be overlap. Indeed, one can easily see that the inclusion $\mu_S \subset \mu$ strictly holds for $\mu \in \{\ell_\infty, c, c_0\}$. Similarly, one can deduce that the inclusion $\mu \subset \mu_\Delta$ also strictly holds for $\mu \in \{\ell_\infty, c, c_0\}$; where S and Δ are matrix operators.

Recently, in [1], Mursaleen and Noman constructed new sequence spaces by using a matrix domain over a normed space. They also studied some topological properties and inclusion relations of these spaces.

It is well known that paranormed spaces have more general properties than normed spaces. In this work, we generalize the normed sequence spaces defined by Mursaleen [1] to paranormed spaces. Furthermore, we introduce new sequence spaces over the paranormed space by using the expansion method. Then, we investigate behavior of the sequence spaces according to topological properties and inclusion relations. Finally, we give certain matrix transformation on these sequence spaces and their duals.

In the literature, the approach of constructing a new sequence space on the normed space or the paranormed space by means of the matrix domain of a particular limitation method has recently been employed by several authors; see, for example, Wang [2], Nq and Lee [3], Malkowsky and Savaş, [4] Malkowsky [5], Mursaleen and Noman [1] Altay and Başar [6,7], Altay et al. [8], Başar and Altay [9–11], Aydın and Başar [12,13], Karakaya and Polat [14], Polat et al. [15], Savaş et al. [16] and Demiriz and Çakan [17]. Some of the above-mentioned authors introduced the following sequence spaces: $(\ell_\infty)_{C_1} = X_\infty$ and $(\ell_p)_{C_1} = X_p$ in [3], $\mu_G = Z(u, v; \mu)$ in [4], $(\ell_p)_\Delta = bv_p$ and $(\ell_\infty)_\Delta = bv_\infty$ in [9], $\ell_\infty^\lambda = (\ell_\infty)_\Lambda$, $c^\lambda = (c)_\Lambda$, $c_0^\lambda = (c_0)_\Lambda$

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