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On some generalized difference sequence spaces and related matrix transformations

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Abstract. In this paper we introduce β-duals and γ-duals of the sequence spaces $l_\infty(\Delta^m)$, $c(\Delta^m)$, $(m \in \mathbf{N})$ where for instance $l_\infty(\Delta^m) = \{x = (x_k) : (\Delta^m x_k) \in l_\infty\}$, and we characterize some matrix classes related with these sequence spaces. This study generalizes some results of Kızmaz [4] in special cases.

Key words: difference sequences, matrix transformations, β-dual, γ-dual.

1. Introduction

Let l_∞, c, and c_0 be the linear spaces of bounded, convergent and null sequences $x = (x_k)$ with complex terms, respectively, normed by

$$||x||_\infty = \sup_k |x_k|$$

where $k \in \mathbf{N} = \{1, 2, \ldots\}$, the set of positive integers.

Kızmaz [4] defined the sequence spaces

$$\begin{aligned} l_\infty(\Delta) &= \{x = (x_k) : \Delta x \in l_\infty\}, \\ c(\Delta) &= \{x = (x_k) : \Delta x \in c\}, \\ c_0(\Delta) &= \{x = (x_k) : \Delta x \in c_0\} \end{aligned}$$

where $\Delta x = (\Delta x_k) = (x_k - x_{k+1})$, and showed that these are Banach spaces with norm

$$||x|| = |x_1| + ||\Delta x||_\infty.$$

After then Et [1] defined the sequence spaces

$$\begin{aligned} l_\infty(\Delta^2) &= \{x = (x_k) : \Delta^2 x \in l_\infty\}, \\ c(\Delta^2) &= \{x = (x_k) : \Delta^2 x \in c\}, \\ c_0(\Delta^2) &= \{x = (x_k) : \Delta^2 x \in c_0\} \end{aligned}$$

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