Domain of generalized Riesz difference operator of fractional order in Maddox's space $\ell(p)$

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Abstract: Let $\Gamma(x)$ denotes the gamma function of a real number $x \notin \{0, -1, -2, \ldots\}$. Then the difference matrix Δ^{Bq} of fractional order q is defined as

$$(\Delta^{Bq} v)_i = \int_{l=0}^{\infty} (-1)^l \frac{\Gamma(q+1)}{l!\Gamma(q-l+1)} v_{i-l}.$$

In this paper we introduced paranormed Riesz difference sequence space $\mathbf{r}^t(\Delta^{Bq})$ of fractional order q obtained by the domain of generalized backward fractional difference operator $R^t\Delta^{Bq}$ in Maddox's space $\ell(p)$. We investigate certain topological properties and obtain the Schauder basis of the space $\mathbf{r}^t(\Delta^{Bq})$. We also obtain the $\alpha-$, $\beta-$ and $\gamma-$duals and characterize certain matrix classes related to the space $\mathbf{r}^t(\Delta^{Bq})$.

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References

[1] B. Altay, F. Başar, On the paranormed Riesz sequence spaces of non-absolute type, Southeast Asian Bull. Math., 26(2002), 701-715.

[2] E. Malkowsky, Recent results in the theory of matrix transformations in sequence spaces, Mat. Vesnik, 49(1997), 187-196.

[3] P. Baliarsingh, S. Dutta, A unifying approach to the difference operators and their applications, Bol. Soc. Paran. Mat., 33(2015), 49-57.

[4] P. Baliarsingh, S. Dutta, On the classes of fractional order difference sequence spaces and their matrix transformations, Appl. Math. Comput., 250(2015), 665-674.

[5] T. Yaying, B. Hazarika, On sequence spaces generated by binomial difference operator of fractional order, Math. Slovaca, 69(4)(2019), 901-918.

[6] T. Yaying, Paranormed Riesz difference sequence spaces of fractional order, Kragujevac J. Math., 46(2)(2022), 175-191.

[7] K.G. Grosse-Erdmann, Matrix transformation between the sequence spaces of Maddox, J. Math. Anal. Appl. 180(1993), 223-238.

[8] I.J. Maddox, Paranormed sequence spaces generated by infinite matrices, Proc. Camb. Phil. Soc. 64(1968), 335-340.

[9] I.J. Maddox, Elements of functional analysis, Cambridge University Press, 2nd ed., Cambridge, 1988.