HIROSHIMA MATH. J.
26 (1996), 75–77

On some new sequence spaces

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(Received September 27, 1991)

ABSTRACT. In this paper we introduce and study some new sequence spaces.

1. Introduction

Let ℓ_∞ denote the Banach space of all real or complex bounded sequences $x = (x_k)$ normed as usual by $\|x\| = \sup_k |x_k|$.

Let σ be a mapping of the set of positive integers into itself. A continuous linear functional Φ on ℓ_∞ is said to be an invariant mean or σ-limit if and only if

i) $\Phi(x) \geq 0$ whenever $x_n \geq 0$ for all n,

ii) $\Phi(e) = 1$, where $e = (1, 1, \ldots)$

iii) $\Phi(x_{\sigma(n)}) = \Phi(x)$ for all $x \in \ell_\infty$.

Let V_σ denote the space of bounded sequences all of whose σ-means are equal, if $x = (x_k)$, we write $Tx = (x_{\sigma(n)})$. It can be shown [6] that

$$V_\sigma = \{x \colon \lim_m t_{mn}(x) = L \text{ exists uniformly in } n,\ L = \sigma\text{-}\lim x\},$$

where

$$t_{mn}(x) = (x_n + Tx_n + \cdots + T^m x_n)/(m+1) \qquad \text{and} \qquad t_{-1,n}(x) = 0\,. \tag{A}$$

In the case that σ is the translation mapping $n \to n+1$, the σ-mean is often called a Banach limit and V_σ is the set of almost convergent sequences [1].

In accordance with Mursaleen [4], $x = (x_n) \in \ell_\infty$ is said to be strongly σ-convergent to a number L if

$$1/m \sum_{i=1}^{m} |x_{\sigma^i(n)} - L| = 0 \text{ as } m \to \infty \qquad \text{uniformly in } n\,.$$

Recently strongly σ-convergent sequences have been discussed and this concept of strong σ-convergence has been generalized by Savaş [5] in the following way:

1991 *Mathematics Subject Classification.* 40A05, 40C05

Key words and phrases. Sequence space, invariant convergence, paranormed space.