THE $\overline{\lambda}$-STATISTICALLY CONVERGENT DOUBLE SEQUENCES IN FUZZY NORMED SPACES

by

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We introduce double $\overline{\lambda}$-statistically convergent sequences and double $\overline{\lambda}$-statistically Cauchy sequences in the fuzzy normed spaces. We study $[V,\overline{\lambda}]$ and $[C,1]$-summabilities for double sequences. In addition, we obtain the relation between these concepts and $\overline{\lambda}$-statistically convergence.

Key words: *$\overline{\lambda}$-convergence, double sequence, summabilities*

Introduction

Theory of statistical convergence was firstly originated by Fast [1]. After Fridy [2] and Šalat [3], statistical convergence became a notable topic in summability theory.

Fuzzy set theory has become an important working area for 40 years. It has been used in many engineering applications, control of chaos, non-linear operator, and population changes. It affected many mathematicians to investigate new kinds of sequence spaces and to study this type convergence. Fuzzy norm idea was firstly considered by Katsaras [4] in the fuzzy topological vector spaces. Also, Alimohammady and Roohi [5] introduced compactness in fuzzy minimal spaces. Felbin [6] was inspired by Kaleva and Seikkala [7], and then he introduced fuzzy norm of the linear space. Topological characterizations of fuzzy normed linear spaces were found in [8, 9]. Other studies on the same spaces can also be found in [10, 11].

The convergence of a sequence using fuzzy numbers was given by Matloka [12]. Nanda [13] studied the seqeuences with fuzzy numbers. He also formed complete metric space using set of all convergent sequences with fuzzy numbers. Mursaleen and Edely [14] introduced statistical convergence via double sequences and identified some results about statistical convergence. Cakan and Altay [15], Altay and Basar [16], and Tripaty [17] studied double sequences in summability theory. Statistical convergence using fuzzy numbers was given by Nuray and Savas [18]. Savas and Mursaleen [19] studied statistical convergent double sequences via fuzzy numbers. Sencimen and Pehlivan [20] introduced statistically convergent (resp. statistically Cauchy) sequence in the fuzzy normed linear space. Considering [20], Mohiuddine *et al.* [21] studied double sequences in the same spaces.

Mursaleen [22] introduced the idea of λ-statistical convergence. Using fuzzy numbers, λ-statistical convergence was presented Savas [23]. The λ-statistical convergence by using double sequences was obtained by Savas [24], and Savas and Patterson [25, 26]. Turkmen and Cinar [27] considered λ-statistical convergence within fuzzy normed linear space.

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