46th Annual Iranian Mathematics Conference
25-28 August 2015
Yazd University
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Some fixed point results in non-Archimedean probabilistic Menger space

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Abstract

In this paper, we introduce the notions of (α, β, φ)-contractive mapping, (α, ϕ, ψ)-contractive mapping and establish some results of fixed point for this class of mappings in the setting of non-Archimedean probabilistic Menger spaces. Also, some examples are given to support the usability of our results.

Keywords: Continuous t-norm, non-Archimedean probabilistic Menger space, contractive mapping
Mathematics Subject Classification [2010]: 47H10, 54H25

1 Introduction

In 1972, Menger [1] introduced the concept of a probabilistic metric space, and a large number of authors have done considerable work in such field [5, 6]. The notion of non-Archimedean Menger space has been established by Istratescu and Crivat [2]. The existence of fixed point of mappings on non-Archimedean Menger space has been given by Istratescu [3]. In this paper, we give some fixed point results for some new classes of contractive mappings in probabilistic Menger space. We first bring notion, definitions and known results, which are related to our work. For more details, we refer the reader to [4].

Definition 1.1. A $t-$norm is a function $T : [0,1]^2 \to [0,1]$ which is associative, commutative, nondecreasing in each cordinate and $T(a,1) = a$ for every $a \in [0,1]$.

Definition 1.2. Let X be a non-empty set and D be the set of all left-continuous distribution functions. An ordered pair (X, F) is called a non-Archimedean probabilistic metric space (briefly a N.A PM-space) if F is a mapping from $X \times X \to D$ satisfying the following conditions:

(i) $F_{x,y}(t) = 1, \quad \text{for all} \quad t > 0 \quad \text{if and only if} \quad x = y,$

(ii) $F_{x,y}(t) = F_{y,x}(t),$

(iii) $F_{x,y}(0) = 0,$

(iv) If $F_{x,y}(t) = F_{y,z}(s) = 1$ then $F_{x,z}(max\{t,s\}) = 1$ for all $x, y, z \in X$ and $t, s > 0$.

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