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PENTAPARTITIONED NEUTROSOPHIC PYTHAGOREAN BAIRE SPACES

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Abstract

In the paper, we introduced the concept of pentapartitioned neutrosophic Pythagorean Baire space and present some of its characteristics.

1. Introduction

Florentine Smarandache [15] introduced the idea of neutrosophic set in 1995 that provides the information of neutral thought by introducing the new issue referred to as uncertainty within the set. Thus neutrosophic set was framed and it includes the parts of truth membership function (T), indeterminacy membership function (I), and falsity membership function (F) severally. Neutrosophic sets deals with non normal interval of $]-0 1+[$ pentapartitioned neutrosophic set and its properties were introduced by Malik and Surpati Pramanik [14]. In this case, indeterminacy is divided into three components: contradiction, ignorance, and an unknown membership function. The concept of pentapartitioned neutrosophic pythagorean sets was initiated by R. Radha and A. Stanis Arul Mary [9]. In this paper, we applying this set to Baire Spaces.

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2. Preliminaries

2.1 Definition [2]. Let X be a universe. A pentapartitioned neutrosophic pythagorean [PNP] set A with T, F, C and U as dependent neutrosophic components and I as independent component for A on X is an object of the form

$$A = \{\langle x, T_A, C_A, I_A, U_A, F_A \rangle : x \in X\}$$

Where

$$T_A + F_A \le 1, C_A + U_A \le 1 \text{ and}$$

$$(T_A)^2 + (C_A)^2 + (I_A)^2 + (U_A)^2 + (F_A)^2 \le 3$$

Here, $T_A(x)$ is the truth membership, $C_A(x)$ is contradiction membership, $U_A(x)$ is ignorance membership, $F_A(x)$ is the false membership and $I_A(x)$ is an unknown membership.

2.2 Definition [2]. The complement of a pentapartitioned neutrosophic pythagorean set A on R Denoted by A^C or A^* and is defined as

$$A^C = \{\langle x, F_A(x), U_A(x), 1 - G_A(x), C_A(x), T_A(x) \rangle : x \in X\}$$

2.3 Definition [2]. Let

$A = \langle x, T_A(x), C_A(x), G_A(x), U_A(x), F_A(x) \rangle$ and

$B = \langle x, T_B(x), C_B(x), G_B(x), U_B(x), F_B(x) \rangle$

are pentapartitioned neutrosophic pythagorean sets. Then

$$A \cup B = \langle x, \max(T_A(x), T_B(x)), \max(C_A(x), C_B(x)), \min(G_A(x), G_B(x)), \min(U_A(x), U_B(x)), \min(F_A(x), F_B(x)) \rangle$$

$$A \cap B = \langle x, \min(T_A(x), T_B(x)), \min(C_A(x), C_B(x)), \max(G_A(x), G_B(x)), \max(U_A(x), U_B(x)), \max(F_A(x), F_B(x)) \rangle.$$

3. PNP Baire Spaces

Definition 3.1. Let (X, T) be a PNP topological space. A PNP set A in (X, T) is called PNP first category if $A = A = \bigcup_{i=1}^{\infty} B_i$, where B_i's are PNP nowhere dense sets in (X, T). Any other PNP set in (X, T) is said to be of PNP second category.

Definition 3.2. A PNPTS (X, T) is called PNP first category space if the PNP set 1_N is a PNP first category space in (X, T). That is $1_N = \bigcup_{i=1}^{\infty} A_i$, where A_i's are PNP nowhere dense sets in (X, T). Otherwise (X, T) will be a PNP second category space.

Proposition 3.3. *Let A be a PNP first category set in (X, T), then $A^* = \bigcap_{i=1}^{\infty} B_i$, where $PNPCl(B_i) = 1_N$.*

Proof. Let A be a PNP first category set in (X, T), Then $A = \bigcup_{i=1}^{\infty} A_i$, where's are PNP nowhere dense sets in (X, T). Now $A^* = (\bigcup_{i=1}^{\infty} A_i)^*$ $= \bigcap_{i=1}^{\infty} (A_i)^*$. Now A_i is PNP nowhere dense set in (X, T). Let us put $B_i = (A_i)^*$. Then $(A_i)^* = \bigcap_{i=1}^{\infty} B_i$ where $\text{PNPCl}(B_i) = 1_N$.

Definition 3.4. Let A be a PNP first category set in (X, T). Then A^* is called a PNP residual set in (X, T).

Definition 3.5. Let (X, T) be a PNPTS. Then (X, T) is said to be PNP Baire space if $\text{PNPInt}(\bigcup_{i=1}^{\infty} A_i = 0_N$, where A_i's are PNP nowhere dense sets in (X, T).

Proposition 3.6. *If $PNPInt(\bigcup_{i=1}^{\infty} A_i = 0_N$ where $PNPInt(A_i) = 0_N$ and $A_i \in T$, then (X, T) is a PNP Baire space.*

Proof. Now $A_i \in T$ implies that A_i is a PNP open set in (X, T). Since $\text{PNPInt}(A_i) = 0_N$. Then A_i is a PNP nowhere dense set in (X, T). $\therefore$ $\text{PNPInt}(\bigcup_{i=1}^{\infty} A_i) = 0_N$, where A_i's are PNP nowhere dense set in (X, T). Hence (X, T) is a PNP Baire space.

Proposition 3.7. *If* $PNPCl(\bigcap_{i=1}^{\infty} A_i = 1_N$, *where* A_i*'s are PNP dense and PNP open sets in* (X, T), *then* (X, T) *is a PNP Baire space*.

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