



A Relation between π Generalized Pre Connectedness and π Generalized Supra Connectedness In Intuitionistic Fuzzy Topological Space

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Abstract

The aim of this paper is to give the concepts of intuitionistic fuzzy π generalized pre connectedness with study its properties. Finally we study the relation between intuitionistic fuzzy π generalized pre connectedness and intuitionistic fuzzy π generalized supra connectedness in intuitionistic fuzzy topological space .

1. Introduction

In 1965, the concept of " fuzzy set" was introduced by Zadeh in his classical paper [1]. Chang [2] introduced the concept of "fuzzy topological space" by using concept of fuzzy sets. After that, in 1986, Atanassov [3] introduced the " intuitionistic fuzzy sets" . in the 1997 Coker [4] defined the concept of "intuitionistic fuzzy topological spaces". Recently appeared many concepts of fuzzy topological such as fuzzy connectedness have been generalized in intuitionistic fuzzy topological spaces ,also S. Özçağ and D. Çoker [5] introduced the π -generalized Semi Connectedness in "Intuitionistic Fuzzy Topological Spaces connectedness" .In this paper we introduce concept of intuitionistic fuzzy π generalized pre connectedness with it relation intuitionistic fuzzy π generalized supra connectedness and investigates some them properties .

2. Preliminaries

Definition 2.1: [3] Let $X \neq \emptyset$. An "intuitionistic fuzzy set" ("IFS" ,in short) M in X is an object having the form $M = \{ \langle x, \sigma_M(x), \delta_M(x) \rangle : x \in X \}$ where the functions $\sigma_M(x) : X \rightarrow [0, 1]$ and $\delta_M(x) : X \rightarrow [0, 1]$ denote the degree of membership (namely " $\mu_A(x)$ ") and the degree of non-

membership (namely " $\gamma_A(x)$ ") $\forall x \in X$ to the set M , respectively, and $0 \leq \sigma_M(x) + \delta_M(x) \leq 1$ $\forall x \in X$. Denote by "IFS(X)", the set of all "intuitionistic fuzzy sets" in X .

Definition 2.2: [7] Let M and N be "IFSs" of the form $M = \langle x, \sigma_M, \delta_M \rangle$ and $N = \langle x, \sigma_N, \delta_N \rangle$. Then

- 1- $M \subseteq N$ iff $\sigma_M(x) \leq \sigma_N(x)$ and $\delta_M(x) \geq \delta_N(x)$ $\forall x \in X$.
- 2- $M = N$ iff $M \subseteq N$ and $N \subseteq M$.
- 3- $M^c = \{ \langle x, \delta_M(x), \sigma_M(x) \rangle : x \in X \}$.
- 4- $M \cap N = \{ \langle x, \sigma_M(x) \wedge \sigma_N(x), \delta_M(x) \vee \delta_N(x) \rangle : x \in X \}$.
- 5- $M \cup N = \{ \langle x, \sigma_M(x) \vee \sigma_N(x), \delta_M(x) \wedge \delta_N(x) \rangle : x \in X \}$.
- 6- $\tilde{0} = \{ \langle x, 0, 1 \rangle : x \in X \}$, $\tilde{1} = \{ \langle x, 1, 0 \rangle : x \in X \}$.

we use this notation:

$M = \langle x, (\sigma_M, \sigma_N), (\delta_M, \delta_N) \rangle$ instead of $M = \langle x, (M/\sigma_M, N/\sigma_M), (M/\delta_M, N/\delta_N) \rangle$.

Definition 2.3: [3] Let $X \neq \emptyset$. An "intuitionistic fuzzy topology" ("IFT" , for short) on X is a collection ρ of "IFSs" in X with this conditions:

- 1) $\tilde{0}, \tilde{1} \in \rho$.
- 2) $j_1 \cap j_2 \in \rho$ for any $j_1, j_2 \in \rho$.

3) $\cup j_i \in \rho$ for any arbitrary family $\{G_i : i \in J\} \subseteq \rho$. The pair (X, ρ) is called an "intuitionistic fuzzy topological space" ("IFTS", for short), any "IFS" in ρ is "intuitionistic fuzzy open set" ("IFOS", for short) in X . The complement M^c of "IFOS" M in an "IFTS" (X, ρ) is called

"intuitionistic fuzzy closed set" ("IFCS", for short) in X .

Definition 2.4: [3] Let (X, ρ) be an "IFTS" and $M = \langle x, \sigma_M, \delta_M \rangle$ be "IFS" in X . Then :

$\text{Int}(M) = \cup \{J : J \text{ is IFOS in } X, J \subseteq M\}$,

$\text{Cl}(M) = \cap \{L : L \text{ is IFCS in } X, M \subseteq L\}$.

Definition 2.5: An "IFS" $M = \{\langle x, \rho_M(x), \delta_M(x) \rangle : x \in X\}$ in an "IFTS" (X, ρ) is said to be an

1) [4] "intuitionistic fuzzy semi closed set" ("IFSCS", for short) if $\text{Int}(\text{Cl}(M)) \subseteq M$,

2) [4] "intuitionistic fuzzy α -closed set" ("If α CS", for short) if $\text{Cl}(\text{Int}(\text{Cl}(M))) \subseteq M$,

3) [4] "intuitionistic fuzzy pre-closed set" ("IFPCS", for short) if $\text{Cl}(\text{Int}(M)) \subseteq M$,

4) [8] "intuitionistic fuzzy generalized closed set" ("IFGCS", for short) if $\text{Cl}(M) \subseteq K$ whenever $M \subseteq K$ and K is an "IFOS",

5) [8] "intuitionistic fuzzy π open set" ("IF π GSCS", for short) if $s\text{Cl}(M) \subseteq K$, and K is "IF β ",

6) [8] "intuitionistic fuzzy π open set" ("IF π GSCS", for short) if $p\text{Cl}(M) \subseteq K$, and K is "IF β ",

7) [8] "intuitionistic fuzzy generalized semi closed set" ("IF π GSCS", for short) if $s\text{Cl}(M) \subseteq K$, whenever $M \subseteq K$ and K is an IF π OS,

8) [8] "intuitionistic fuzzy generalized pre closed set" ("IF π GPCS", for short) if $p\text{Cl}(M) \subseteq K$, whenever $M \subseteq K$ and K is an IF π OP.

Definition 2.6: [8] An "IFS" M is said to be an "intuitionistic fuzzy π – generalized semi open set" ("IF π GSOS", for short) in X if M^c is "IF π GSCS" in X . The collection of "IF π GSCSs" of "IFTS" (X, ρ) is write by "IF π GSC(X)".

Result 2.7: [8] Every "IFCS", "If α CS", "IFGCS", "IFPCS", "If α GCS" is an "IF π GSCS" but the reverse not true in generally.

Definition 2.8: [8] Let M be an "IFS" in an "IFTS" (X, ρ) . Then " π -generalized semi closure" M (" $\pi\text{gscl}(M)$ ", for short) and " π -generalized Semi interior" of M (" $\pi\text{gsint}(M)$ ", for short) are :

$\pi\text{gsInt}(M) = \cup \{J : J \text{ is IF}\pi\text{GSOS in } X, J \subseteq M\}$,
 $\pi\text{gscl}(M) = \cap \{L : L \text{ is IF}\pi\text{GSCS in } X, M \subseteq L\}$.

Definition 2.9: [3] Let a map $T: (M, \rho) \rightarrow (N, \gamma)$. If $N = \{\langle w, \sigma_N(w), \delta_N(w) \rangle : w \in W\}$ is an "IFS" in W , then the image of N under T denoted by $T^{-1}(N)$, is the "IFS" in X defined by

$T^{-1}(N) = \{\langle r, T^{-1}(\sigma_N(r)), T^{-1}(\delta_N(r)) \rangle : r \in R\}$. If $M = \{\langle r, \sigma_M(r), \delta_M(r) \rangle : r \in R\}$ is an "IFS" in M , then the image of M under T denoted by $T(M)$ is "IFS" in W where ,

$T(M) = \{\langle w, T(\sigma_M(w)), T(\delta_N(w)) \rangle : w \in W\}$ where
 $T(\delta_B(w)) = 1 - T(1 - \delta_N)$.

Definition 2.10: [8] A map $T: (X, \rho) \rightarrow (Y, \gamma)$ is "intuitionistic fuzzy π generalized semi irresolute" ("IF π GSir, for short) if $T^{-1}(N)$ is "IF π GSCS" in $(X, \rho) \forall$ "IF π GSCS" N of (Y, γ) .

Definition 2.11: [8] A map $T: (X, \rho) \rightarrow (Y, \gamma)$ is "intuitionistic fuzzy π generalized semi continuous" ("IF π GSC", for short) if $T(M)$ is "IF π GSOS" in $(Y, \gamma) \forall$ "IF π GSOS" M of (X, ρ) .

Definition 2.12: A map $T: (X, \rho) \rightarrow (Y, \gamma)$ is (a) [4] "intuitionistic fuzzy closed mapping" ("IFCM", for short) if $T(M)$ is "IFCS" in $Y \forall$ "IFCS" A in X .

(b) [4] "intuitionistic fuzzy α – closed mapping" ("If α CM", for short) if $T(M)$ is "If α CS" in $Y \forall$ "IFCS" M in X .

Definition 2.13: [6] "IFTS" (X, ρ) is "IF π T $_{1/2}$ " space if every "IFRWGCS" in X is "IFCS" in X , where IFRWGCS is brief of Intuitionistic Fuzzy Regular Generalized Closed Set.

Definition 2.14: [6] "IFTS" (X, ρ) is "IF π GT $_{1/2}$ " space if every "IFRWGCS" in X is "IFPCS" in X .

Definition 2.15: [5] "IFTS" (X, ρ) is said to be "intuitionistic fuzzy C_5 - connected space" if $\tilde{0}$ and $\tilde{1}$ are both "IFOS" and "IFCS" only.

Definition 2.16: [5] "IFTS" (X, ρ) is "intuitionistic fuzzy GO-connected space" if $\tilde{0}$ and $\tilde{1}$ are both "IFGOS" and "IFGCS" only.

Definition 2.17: [5] "IFTS" (X, ρ) is an "intuitionistic fuzzy C_5 -connected" between "IFS" M, N if $\nexists$ "IFOS" Q in (X, ρ) s.t $M \subseteq Q$ and $Q \subseteq N^c$.

Definition 2.18: [5] "IFTS" (X, ρ) is "IF π GS connected space" if $\tilde{0}$ and $\tilde{1}$ are both IF π GSOS" and "IF π GSCS" only.

3. "Intuitionistic fuzzy π generalized pre connected spaces"

In this section, we have introduced "intuitionistic fuzzy π generalized pre connected" ("IF π GP connected", for short) space and studied some of its properties.

Definition 3.1: An "intuitionistic fuzzy π – generalized pre open sets" ("IF π GPOS", for short)(resp. "pre closed sets" ("IF π GPCS", for short) in (X, ρ) if its complement M^c is "IF π GPCS" in X (resp. if its complement M is "IF π GPOS" in (X, ρ)). The collection of "IF π GPOS" (resp. "IF π GPCS") of "IFTS" (X, ρ) is denoted by "IF π GPO(X)" (resp. "IF π GPC(X)").

Definition 3.2: "IFTS" (X, ρ) is "IF π GP connected space" if $\tilde{0}$ and $\tilde{1}$ are both "IF π GPOS" and "IF π GPCS" only.

Example 3.3: Let $W = \{m, n\}$ and $\rho = \{\tilde{0}, K, \tilde{1}\}$ be "IFT" on X , where

$K = \langle w, (0.3, 0.2), (0.4, 0.2) \rangle$. Then "IFTS" (X, ρ) is "IF π GP connected space" between the "IFS" $M = \langle w, (0.7, 0.1), (0.3, 0.3) \rangle$ and $N = \langle w, (0.1, 0.2), (0.5, 0.3) \rangle$

Proposition 3.4: Each "IF π GP connected space" is "IFC₅-connected space"

Proof: Let (X, ρ) is "IF π GP connected space". Suppose that (X, ρ) is not "intuitionistic fuzzy C₅ – connected space", then $\exists$ "IFS A" which is both "intuitionistic fuzzy open" and "intuitionistic fuzzy closed" in (X, ρ) . So M is "IF π GPOS" and "IF π GPCS" in (X, ρ) . Hence (X, ρ) is not an "IF π GP connected space". Thus we get a contradiction. Therefore (X, ρ) is "intuitionistic fuzzy C₅ – connected space".

Remark 3.5: The converse of above proposition is not true. the example bellow shows the converse is not true.

Example 3.6: Let $W = \{m, n\}$, $\rho = \{\tilde{0}, K, \tilde{1}\}$ be "IFT" on W , where

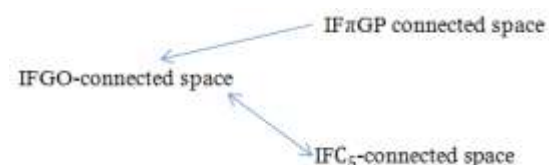
$K = \langle w, (0.2, 0.2), (0.1, 0.8) \rangle$. Then (X, ρ) is "IFC₅-connected space" because the "intuitionistic fuzzy sets" $\tilde{0}$ and $\tilde{1}$ are both "IFOS" and "IFCS", but not an "IF π GP connected space", since the "IFS K" in ρ is both an "IF π GPOS" and an "IF π GPCS" in (X, ρ) .

Proposition 3.7: Let (X, ρ) is an "IFTS". Then (X, ρ) is "GO-connected" iff $\forall$ "IF π GP connected space".

Proof: $\Rightarrow$ Let (X, ρ) is "IF π GP connected space". suppose that (X, ρ) "IFGO-connected space", let $\tilde{0}$ and $\tilde{1}$ are both "IFGOS" and IFGCS ((X, ρ) is an "IFGO-connected space") since "IF π GPOS" and "IF π GPCS" are $\tilde{0}$ and $\tilde{1}$. Hence (X, ρ) is "IF π GP connected space".

$\Leftarrow$ Suppose (X, ρ) is not an "IFGO – connected space", then $\exists$ "IFS M" which is both "IFGOS" and "IFGCS" in (X, ρ) . So M is both "IF π GPOS" and "IF π GPCS" in (X, ρ) . Thus (X, ρ) is not "IF π GP connected space". Hence, we get a contradiction. Thus (X, ρ) is "IFGO – connected space".

Remark 3.8: Let (X, ρ) is an "IFTS". The implications are valid:



Example 3.10: Let $W = \{m, n\}$ and $\rho = \{\tilde{0}, K, \tilde{1}\}$ be "IFT" on X , where

$K = \langle w, (0.6, 0.1), (0.2, 0.2) \rangle$. Then "IFTS" (X, ρ) is IFC₅-connected space between the "IFS"

$M = \langle w, (0.5, 0.4), (0.4, 0.5) \rangle$ and $N = \langle w, (0.7, 0.3), (0.2, 0.6) \rangle$, but it is not IF π GP connected

space. Also (X, ρ) is IFGO-connected space but it is not IF π GP connected space.

Proposition 3.11: The "IFTS" (X, ρ) is "IF π GP connected space" iff $\exists$ no non-zero

"IF π GPOS" M and N in (X, ρ) s.t $M = N^c$.

Proof: Let M and N be two "IF π GPOS" in (X, ρ) such that $M \neq \tilde{0}$, $N \neq \tilde{1}$ and $M = N^c$. Therefore

N^c is an "IF π GPCS". Since $M \neq \tilde{0}$, $N \neq \tilde{1}$. So that N is "IFS" which is both "IF π GPOS" and

"IF π GPCS" in (X, ρ) . Thus (X, ρ) is not "IF π GP connected space", but this is a contradiction.

Hence $\exists$ no non-zero "IF π GPOS" M and N in (X, ρ) s.t $M = N^c$. Let M be both

"IF π GPOS" and "IF π GPCS" in (X, ρ) such that $\tilde{0} \neq M \neq \tilde{1}$. Now let $N = M^c$. Then N is

"IF π GPOS" and $B \neq 1$. Hence $N^c = M \neq \tilde{0}$, and its contradiction. Therefore (X, ρ)

is "IF π GP connected space".

Proposition 3.12: Let (X, ρ) be "IF π T_{1/2}" space, then this implications are equivalent:

(i) (X, ρ) is "IF π GP connected space".

(ii) (X, ρ) is "IFGO-connected space".

(iii) (X, ρ) is "IFC₅-connected space".

Proof: (i) $\rightarrow$ (ii): By using Proposition 3.8, we get the result.

(ii) $\rightarrow$ (iii): By using Remark 3.9, we get the result.

(iii) $\rightarrow$ (i): Let (X, ρ) be "IFC₅-connected space".

Suppose (X, ρ) is not "IF π GP connected space", so $\exists$ "IFS M" in (X, ρ) which is both "IF π GPOS" and "IF π GPCS" in

(X, ρ) . But (X, ρ) is an "IF π T_{1/2}" space, M is both "IFO" and "IFC" in (X, ρ) . Thus (X, ρ)

not "IFC₅-connected", and its contradiction. Hence (X, ρ) must be an "IF π GP connected space".

Definition 3.13: A map $T: (X, \rho) \rightarrow (Y, \gamma)$ is "intuitionistic fuzzy π generalized pre irresolute" ("IF π GPir", for brief) if $T^{-1}(N)$ is "IF π GPCS" in $(X, \rho) \forall$ "IF π GPCS N " of (Y, γ) .

Proposition 3.14: If $T: (X, \rho) \rightarrow (Y, \gamma)$ is "IF π GP continuous" and (X, ρ) is an "IF π GP connected space", then (Y, γ) is "IFC₅ connected space".

Proof: Let (X, ρ) be "IF π GP connected space". Suppose that (Y, γ) is not "intuitionistic fuzzy C₅-connected space", then $\exists$ "IFS M" which is both "IFO" and "IFC" in (Y, γ) . Since T is "IF π GP continuous mapping", so $T^{-1}(M)$ is "IF π GPOS" and "IF π GPCS" in (X, ρ) , but it is a contradiction.

Therefore (Y, γ) is IFC₅-connected space.

Proposition 3.15: If $T: (X, \rho) \rightarrow (Y, \gamma)$ is "IF π GPir" and (X, ρ) is an "IF π GP connected space", then (Y, γ) is "IF π GP connected space".

Proof: Suppose that (Y, γ) is not "IF π GP connected space", so $\exists$ "IFS M" s.t M is both

"IF π GPOS" and "IF π GPCS" in (Y, γ) . Since T is "IF π GP irresolute mapping", $T^{-1}(M)$ is both

"IF π GPOS" and "IF π GPCS" in (X, ρ) , we get a contradiction. Therefore (Y, γ) is an "IF π GP connected space".

Definition 3.16: "IFTS" (X, ρ) is "IF π GP connected" between "IFS" M and N if $\nexists$ "IF π GPOS K " in (X, ρ) s.t $M \subseteq K$ and $K \subseteq M^c$.

Example 3.17: Let $W = \{m, n\}$ and $\rho = \{\tilde{0}, K, \tilde{1}\}$ be "IFT" on X , where

$K = \langle w, (0.3, 0.3), (0.4, 0.5) \rangle$. Then "IFTS" (X, ρ) is "IF π GP connected" between the "IFS"

$M = \langle w, (0.6, 0.2), (0.6, 0.4) \rangle$ and $N = \langle w, (0.6, 0.2), (0.3, 0.3) \rangle$ where $M^c = \langle w, (0.06, 0.4), (0.6, 0.2) \rangle$.

Proposition 3.18: An "IFTS" (X, ρ) is "IF π GP connected" between two "IFSs" M and N iff there is no "IF π GPOS" and "IF π GPCS K " in (X, ρ) s.t $M \subseteq K \subseteq N^c$.

Proof: Let (X, ρ) be "IF π GP connected" between M and N . Suppose that $\exists$ an "IF π GPOS" and "IF π GPCS K " in (X, ρ) s.t $M \subseteq K \subseteq N^c$, then $N \subseteq K^c$ and $M \subseteq K$. So (X, ρ) not "IF π GP connected" between M and N , so we get a contradiction.

Therefore $\exists$ no "IF π GPOS" and an "IF π GPCS K " in (X, ρ) s.t $M \subseteq K \subseteq N^c$.

Conversely suppose that (X, ρ) is not "IF π GP connected" between M and N . So $\exists$ "IF π GPOS K " in (X, ρ) s.t $M \subseteq K$ and $K \subseteq N^c$. So that $\exists$ an "IF π GPOS K " in (X, ρ) s.t $M \subseteq K \subseteq N^c$, but we get a contradiction. Thus (X, ρ) is "IF π GP connected" between M and N .

Proposition 3.19: Let (X, ρ) be an "IFTS" and M and N be "IFS" in (X, ρ) . Then, $M \subseteq N$, iff X is an "IF π GP connected" between M and N .

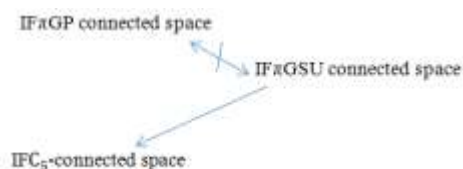
Proof: Suppose (X, ρ) is not "IF π GP connected" between M and N . Then $\exists$ an "IF π GPOS K " in (X, ρ) s.t $M \subseteq K$ and $K \subseteq N^c$. So that $M \subseteq N^c$, but we get a contradiction ($M \subseteq N$). Therefore X is an "IF π GP connected" between M , N .

Conversely suppose (X, ρ) is an "IF π GP connected" between M , N . Thus $M = N$ (by definition of "IF π GPOS connected"). Therefore, $M \subseteq N$.

4-The Relations between π Generalized Pre Connectedness and π Generalized supra connectedness in "IFTS"

Definition 4-1: An "intuitionistic fuzzy π -generalized supra open sets" ("IF π GSUOS", for short)(resp. "supra closed sets" ("IF π GSUCS", for short) in (X, ρ) if its complement M^c is "IF π GSUCS" in X (resp. if its complement M is "IF π GSUOS" in (X, ρ)). The collection of "IF π GSUOS" (resp. "IF π GSUCS") of "IFTS" (X, ρ) is denoted by "IF π GSUO(X)" (resp. "IF π GSUC(X)").

Proposition 4.2: The relation among π Generalized Pre Connectedness and π Generalized supra connectedness of intuitionistic fuzzy connectedness is given in the following diagram.



Proof :

IF π GS connected space $\longrightarrow$ IFC₅-connected space by definition of "IFC₅-connected space" and Remark 3.8, we get the result.

Remark 4.3: By transitivity we get IF π GSU connected space $\longrightarrow$ IFGO-connected space

Remark 4.4:The converse of above proposition are not true. the counter examples bellow shows the converse are not true.

Example 4.5: Recall Example 3.6, we get (X, ρ) is an IFC₅-connected space because the "IFS" $\tilde{0}$ and $\tilde{1}$ are both "IFOS" and "IFCS", but not an "IF π GP connected space", because the "IFS K " in ρ is both an "IF π GPOS" and an "IF π GPCS" in (X, ρ) .

Example 4.6: Let $W = \{m, n, k\}$ and $\rho = \{\tilde{0}, K, \tilde{1}\}$ be "IFT" on W , where

$M = \langle w, (0.7, 0.3), (0.5, 0.2), (0.2, 0.7) \rangle$. Then (X, ρ) is an "IF π GP connected space" because the both "IF π GPOS" and "IF π GPCS" are $\tilde{0}$ and $\tilde{1}$, but not an "IF π GSU connected space", because the "IFS M " in ρ is not "IF π GSUOS" and "IF π GSUCS" in (X, ρ) .

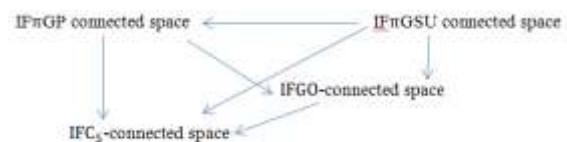
Example 4.7: Let $W = \{m, n, k, h\}$ and $\rho = \{\tilde{0}, K, \tilde{1}\}$ be an "IFT" on W , where

$K = \langle w, (0.6, 0.6), (0.3, 0.2), (0.3, 0.5), (0.3, 0.3) \rangle$. Then (X, ρ) is an "IF π GSU connected space" because the both "IF π GSUOS" and "IF π GSUCS" are $\tilde{0}$ and $\tilde{1}$, but not an "IF π GP connected space", because the "IFS K " in ρ is not an "IF π GPOS" and an "IF π GPCS" in (X, ρ) .

Example 4.8: Let $W = \{m, n, k, h\}$ and $\rho = \{\tilde{0}, K, \tilde{1}\}$ be "IFT" on W , where

$K = \langle w, (0.1, 0.6), (0.2, 0.6), (0.3, 0.3), (0.5, 0.6) \rangle$. Then (X, ρ) is an "IFC₅-connected space" because the IFS $\tilde{0}$ and $\tilde{1}$ are both "IFOS" and "IFCS", but not "IF π GS connected space", since the "IFS K " in ρ is not an "IF π GSUOS" and an "IF π GSUCS" in (X, ρ) .

Proposition 4.9: Let (X, ρ) be "IF π T_{1/2} space", then these relations are given as:



Proof: IFC₅-connected space $\longrightarrow$ IF π GP connected space : its prove in Proposition 3.8.

IF π GP connected space $\longrightarrow$ IFGO-connected space : By using Remark 3.8, and Proposition 4.2, we get the result.

IFGO-connected space $\longrightarrow$ IFC₅-connected space : By using Remark 3.8, and Proposition 4.2, we get the result.

IF π GP connected space $\longrightarrow$ IFC₅-connected space : its prove by transitivity.

IF π GSU connected space $\longrightarrow$ IFGO-connected space : By using Proposition 4.2 we get the result.

IF π GSU connected space $\longrightarrow$ IF π GP connected space

Suppose (X, ρ) be "IF π $T_{1/2}$ " space and (X, ρ) is "IF π GSU connected space" so $\exists$

"IFGOS" and "IFGCS" are $\tilde{0}$ and $\tilde{1}$ in (X, ρ) . Since $\tilde{0}$ and $\tilde{1}$ are

both "IFGPOS" and "IFGSUCS" in (X, ρ) because (X, ρ) be an "IF π $T_{1/2}$ ". Thus (X, ρ) is "IF π GP connected space".

Remark 4.10: The converse of above proposition are not true. The counter examples bellow shows the converse are not true.

Example 4.11: Let $W = \{m, n, k\}$ and $\rho = \rho = \{\tilde{0}, K, \tilde{1}\}$ be "IFT" on W , where $K = \langle x, (0.3, 0.7), (0.3, 0.5), (0.2, 0.1), (0.7, 0.3) \rangle$. Then (X, ρ) is an "IFGO-connected" because the "IFS" $\tilde{0}$ and $\tilde{1}$ are both "IFOS" and "IFCS", but not an "IF π GSU connected space", since the "IFS K " in ρ is not an "IF π GSUOS" and an "IF π GSUCS" in (X, ρ) . Also (X, ρ) is not an "IF π GP connected", since the "IFS K " in ρ is not an "IF π GPOS" and an "IF π GPCS" in (X, ρ) .

Example 4.12: Let $W = \{m, n, k\}$ and $\rho = \{\tilde{0}, K, \tilde{1}\}$ be "IFT" on W , where $K = \langle w, (0.5, 0.6), (0.4, 0.2), (0.5, 0.2), (0.3, 0.7) \rangle$. Then (X, ρ) is an "IFC $_5$ -connected space" because the "IFS" $\tilde{0}$ and $\tilde{1}$ are both "IFOS" and "IFCS", but not "IFGO-connected space", because $\tilde{0}$ and $\tilde{1}$ are not "IFOS" and "IFCS" in (X, ρ) .

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Example 4.13: Let $W = \{m, n, k, w\}$ and $\rho = \{\tilde{0}, K, \tilde{1}\}$ be an "IFT" on W , where $K =$

$\langle w, (0.6, 0.4), (0.5, 0.1), (0.4, 0.3), (0.4, 0.6), (0.8, 0.2) \rangle$. Then (X, ρ) is "IF π GP connected space" because the "IFS" $\tilde{0}$ and $\tilde{1}$ are both "IFPOS" and "IFPCS", but not "IF π GSU connected space", because $\tilde{0}$ and $\tilde{1}$ are not "IFSUOS" and "IFSUCS" in (X, ρ) .

Proposition 4.14: For any "IFTS" (X, ρ) , we have every "IFOS", "IFSUOS", is an "IF π GPOS".

Proof: "IFOS" $\rightarrow$ "IF π GPOS" :

Suppose that (X, ρ) is "IFTS" and $M \subseteq X$. Since every "IFOS" is "IFPOS" also every "IFPOS" is "IFGPOS" in (X, ρ) , thus A^c is an "IFGPCS" in X , so that N^c is an "IF π GPCS" in X . Thus (X, ρ) is "IF π GPCS".

"IFSOS" $\rightarrow$ "IF π GPOS" : it's clear.

Remark 4.15: The converse of above Proposition is not true. the examples bellow shows the converse are not true.

Example 4.16: Let $W = \{m, n\}$ and $H = \langle x, (0.7, 0.1), (0.5, 0.7) \rangle$. Then $\rho = \{\tilde{0}, Q, \tilde{1}\}$ is "IFT" on W . Thus "IFS M " = $\langle w, (0.8, 0.2), (0.9, 0.6) \rangle$ is "IF π GPOS" in (X, ρ) but not "IFOS" in W .

Example 4.17: Let $W = \{r, e\}$ and $S = \langle w, (0.1, 0.9), (0.9, 0.1) \rangle$. Then $\rho = \{\tilde{0}, Q, \tilde{1}\}$ is "IFT" on W . So "IFS M " = $\langle w, (0.2, 0.1), (0.8, 0.2) \rangle$ is "IF π GPOS" but not "IFOS" in W .

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العلاقة بين الترابط من النوع π – Pre والترابط من النوع π – Supra في الفضاءات التوبولوجية

المضيفة الحدسية

عمر صابر مصطفى

قسم الفيزياء ، كلية العلوم ، جامعة تكريت ، تكريت ، العراق

الملخص

ان الهدف من هذا البحث هو تقديم مفاهيم جديدة للترابط المعمم من النوع π – pre في الفضاء التوبولوجي المضطرب الحدسي ودراسة بعض خواصها. واخيرا درسنا العلاقة بين الترابط من النوع π – pre مع الترابط شبه المعمم من النوع π – semi في الفضاء التوبولوجي المضطرب الحدسي.