IOSR Journal of Engineering (IOSRJEN) **www.iosrjen.org**
ISSN (e): 2250-3021, ISSN (p): 2278-8719
Vol. 08, Issue 12, December 2018, ||Ver. -VI|| PP 43-47

IF $i_{\tilde{B}}$G Homeomorphism in topological spaces.

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Abstract
Throughout this paper we have introduced a new concept of intuitionistic fuzzy $\tilde{B}$ generalized homeomorphism and intuitionistic fuzzy i$\tilde{B}$ generalized homeomorphism in intuitionistic fuzzy topological spaces and some of their properties are discussed and also we have compared with existing homomorphism intuitionistic fuzzy topological spaces.
Key words and phrases: *Intuitionistic fuzzy topology, intuitionistic fuzzy $\tilde{B}$ generalizedclosed set, intuitionistic fuzzy $\tilde{B}$ generalized continuous mapping, intuitionistic fuzzy $\tilde{B}$ generalized homeomorphism, intuitionistic fuzzy i$\tilde{B}$ generalized homeomorphism.*

I. Introduction

Zadeh [13] initiated the concepts fuzzy sets in 1965. Later, Atanassov [1] introduced the a new idea about intuitionistic fuzzy sets in 1986, After that Coker [3] has introduced intuitionistic fuzzy topological spaces in 1997. I have studied many research papers, later we get new idea of about intuitionistic fuzzy topological spaces. Further, we have introduced a new paper is intuitionistic fuzzy $\tilde{B}$ generalized homeomorphism and intuitionistic fuzzy i$\tilde{B}$ generalized homeomorphism in intuitionistic fuzzy topological spaces. Also we studied the relations with basic concepts of intuitionistic fuzzy homomorphisms, intuitionistic fuzzy continuous mappings.

II. Preliminaries

Definition 2.1: [1] An intuitionistic fuzzy set (IFS in short) A in X is an object having the form $A = \{\langle x, \mu_A(x), \nu_A(x) \rangle / x \in X\}$,where the functions $\mu_A(x): X \to [0, 1]$ and $\nu_A(x): X \to [0, 1]$ denote the degree of membership (namely $\mu_A(x)$) and the degree of non-membership (namely $\nu_A(x)$) of each element $x \in X$ to the set A, respectively, and $0 \leq \mu_A(x) + \nu_A(x) \leq 1$ for each $x \in X$. Denote by IFS(X), the set of all intuitionistic fuzzy sets in X.

Definition 2.2: [1] Let A and B be IFSs of the form
$A = \{\langle x, \mu_A(x), \nu_A(x) \rangle / x \in X \}$ and $B = \{ \langle x, \mu_B(x), \nu_B(x) \rangle / x \in X \}$. Then
(a) $A \subseteq B$ if and only if $\mu_A(x) \leq \mu_B(x)$ and $\nu_A(x) \geq \nu_B(x)$ for all $x \in X$
(b) $A = B$ if and only if $A \subseteq B$ and $B \subseteq A$
(c) $A^c = \{ \langle x, \nu_A(x), \mu_A(x) \rangle / x \in X \}$
(d) $A \cap B = \{ \langle x, \mu_A(x) \wedge \mu_B(x), \nu_A(x) \vee \nu_B(x) \rangle / x \in X \}$
(e) $A \cup B = \{ \langle x, \mu_A(x) \vee \mu_B(x), \nu_A(x) \wedge \nu_B(x) \rangle / x \in X \}$

Definition 2.3:[3] An intuitionistic fuzzy topology (IFT in short) on X is a family τ of IFSs in X satisfying the following axioms.
(i) $0_\sim, 1_\sim \in \tau$
(ii) $G_1 \cap G_2 \in \tau$ for any $G_1, G_2 \in \tau$
(iii) $\cup G_i \in \tau$ for any family $\{ G_i / i \in J \} \subseteq \tau$.

Definition 2.4:[3] Let (X, τ) be an IFTS and $A = \langle x, \mu_A, \nu_A \rangle$ be an IFS in X. Then the intuitionistic fuzzy interior and intuitionistic fuzzy closure are defined by
$int(A) = \cup \{ G / G$ is an IFOS in X and $G \subseteq A \}$,
$cl(A) = \cap \{ K / K$ is an IFCS in X and $A \subseteq K \}$.

Definition 2.5:[8] An IFS $A = \langle x, \mu_A, \nu_A \rangle$ in an IFTS (X, τ) is said to be an
(i) intuitionistic fuzzy semi closed set (IFSCS in short) if $int(cl(A)) \subseteq A$,
(ii) intuitionistic fuzzy α-closed set (IFαCS in short) if $cl(int(cl(A)) \subseteq A$.

Definition 2.6:[9] An IFS A in an IFTS (X, τ) is said to be an intuitionistic fuzzy π- generalized closed set (IFπGSCS in short) if scl(A) ⊆ U whenever A ⊆ U and U is an IFπOS in (X, τ).

Definition 2.7:[8] An IFS A in an IFTS (X, τ) is an
(i) intuitionistic fuzzy generalized closed set (IFGCS) if cl(A) ⊆ U whenever A ⊆ U and U is an IFOS in X.
(ii) intuitionistic fuzzy alpha generalized closed set (IFαGCS) if αcl(A) ⊆ U whenever A ⊆ U and U is an IFOS in X.

Definition 2.8:[10] Let f be a mapping from an IFTS (X, τ) into an IFTS (Y, σ). Then f is said to be
(i) intuitionistic fuzzy continuous (IF continuous) if $f^{-1}(B) \in$ IFO(X) for every B ∈ σ.
(ii)intuitionistic fuzzy semi continuous (IFS continuous) if $f^{-1}(B) \in$ IFSO(X) for every B ∈ σ.
(iii)intuitionistic fuzzy α-continuous (IFα continuous) if $f^{-1}(B) \in$ IFαO(X) for every B ∈ σ.
(iv)intuitionistic fuzzy generalized continuous (IFG continuous) if $f^{-1}(B) \in$IFGC(X) for every IFCS B in Y.
(v)intuitionistic fuzzy generalized semi continuous (IFGS continuous) if $f^{-1}(B) \in$IFGSC(X) for every IFCS B in Y.
(vi)intuitionistic fuzzy α-generalized continuous (IFαG continuous) if $f^{-1}(B) \in$ IFαGC(X) for every IFCS B in Y.

Definition 2.9:[10] Let f be a mapping from an IFTS (X, τ) into an IFTS (Y, σ). Then *f* is said to be an intuitionistic fuzzy $\widehat{\beta}$ generalized open mapping (IF$\widehat{\beta}$G open mapping) if *f* (A) ∈ IF*f*GOS(X) for every IFOS A in X.

Definition 2.10:[11] A mapping *f*: (X, τ) → (Y,σ) is called an intuitionistic fuzzy π - generalized semi closed mapping (IFπGS closed) if f (A) is an IFπGSCS in (Y,σ) for every IFCS A of (X, τ).

Definition 2.11:[9] Let f be a mapping from an IFTS (X, τ) into an IFTS (Y, σ). Then the map *f* is said to be an intuitionistic fuzzy π- generalized semi irresolute (IFπGS irresolute in short) if $f^{-1}(B) \in$ IFπGCS(X) for every IFπGCS B in Y.

Definition 2.12:[8] Let f be a bijection mapping from an IFTS (X, τ) into an IFTS (Y, σ). Then *f* is said to be
(i) intuitionistic fuzzy homeomorphism (IF homeomorphism) if *f* and f^{-1} are IF continuous mappings.
(ii) intuitionistic fuzzy semi homeomorphism (IFS homeomorphism) if *f* and f^{-1} are IFS continuous mappings.
(iii) intuitionistic fuzzy alpha homeomorphism (IFα homeomorphism in short) if *f* and f^{-1} are IFα continuous mappings.
(iv) intuitionistic fuzzy generalized homeomorphism (IFG homeomorphism in short) if *f* and f^{-1} are IFG continuous mappings.
(v) intuitionistic fuzzy generalized semi homeomorphism (IFGS homeomorphism in short) if *f* and f^{-1} are IFGS continuous mappings
(vi)*intuitionistic fuzzy alpha generalized homeomorphism* (IFαG homeomorphism in short) if *f* and f^{-1} are IFαG continuous mappings.

III. IF$_{\tilde{\beta}}$G homeomorphism

Definition 3.1: A bijection mapping *f*: (X, τ) → (Y,σ) is called an intuitionistic fuzzy $\tilde{B}$ generalized homeomorphism (briefly IF$_{\tilde{\beta}}$G homeomorphism) if *f* and f^{-1} are IF$_{\tilde{\beta}}$G continuous mappings.
We denote the group of all IF$_{\tilde{\beta}}$G homeomorphisms of an IFTS(X, τ) onto itself by **IF$_{\tilde{\beta}}$G-*h*(X, τ).**

Example 3.2: Let X = {a, b}, Y = {u, v} and τ = {$0_\sim$, G_1, $1_\sim$} and σ = { $0_\sim$, G_2, $1_\sim$} where G_1 = ⟨x, (0.21, 0.21), (0.6, 0.6) ⟩ and G_2 = ⟨y, (0.4, 0.7), (0.4, 0.2)⟩. *f* is an IF$_{\tilde{\beta}}$G continuous and f^{-1} is also an IF$_{\tilde{\beta}}$G continuous. ∴ *f* is an IF$_{\tilde{\beta}}$G homeomorphism.

Proposition 3.3: Every IF homeomorphism is an IF$_{\tilde{\beta}}$G homeomorphism.
Proof: Let *f*: (X, τ) → (Y, σ) be an IF homeomorphism. Then *f* and f^{-1} are IF continuous mappings and *f* is bijection. By Proposition, every IF continuous mapping is IF$_{\tilde{\beta}}$G continuous mapping, *f* and f^{-1} are IF$_{\tilde{\beta}}$G continuous. ∴ *f* is IF$_{\tilde{\beta}}$G homeomorphism.

Example 3.4: Let X = {a, b}, Y = { u, v } and = { $0_\sim$, G_1, $1_\sim$ } and σ = {$0_\sim$, G_2, $1_\sim$ } where G_1 = ⟨ x, (0.31, 0.21), (0.6, 0.6) ⟩ and G_2 = ⟨ y, (0.51, 0.41), (0.4, 0.2) ⟩. *f* is an IF$_{\tilde{B}}$G homeomorphism except an IF homeomorphism since *f* and f^{-1} are not IF continuous.

Proposition 3.5: Every IFα homeomorphism is an IF$_{\tilde{B}}$G homeomorphism.
Proof: Let*f*: (X, τ) → (Y, σ) be an IFα homeomorphism. Then *f* and f^{-1} are IFα continuous. By Proposition , every IFα continuous mapping is an IF$_{\tilde{B}}$G continuous, *f* and f^{-1} are IF$_{\tilde{B}}$G continuous mappings. ∴ *f* is an IF$_{\tilde{B}}$G homeomorphism.

Example 3.6: Let X = { a, b }, Y = { u, v } and τ = { $0_\sim$, G_1, $1_\sim$ } and σ = { $0_\sim$, G_2, $1_\sim$ } where G_1 = ⟨ x, (0.51, 0.41), (0.5, 0.6) ⟩ and G_2 = ⟨ y, (0.21, 0.21), (0.7, 0.7) ⟩. *f* is an IF$_{\tilde{B}}$G homeomorphism. For an IFCS A = ⟨ y, (0.7, 0.7), (0.21, 0.21) ⟩ in (Y, σ). Then f^{-1}(A)= ⟨ x, (0.7, 0.7), (0.21, 0.21) ⟩ is not an IFαCS in (X, τ). Thus *f* is not an IFα homeomorphism.

Theorem 3.7: Let *f*: (X, τ) → (Y, σ) be an IF$_{\tilde{B}}$G homeomorphism. Then *f* is an IF homeomorphism if (X, τ) and (Y, σ)are IF$_{\tilde{B}a}T_{1/2}$ space.
Proof: Let B be an IFCS in (Y, σ). Since *f* is an IF$_{\tilde{B}}$G homeomorphism, f^{-1}(B) is an IF$_{\tilde{B}}$GCS in (X, τ). Since (X, τ) is an IF$_{\tilde{B}a}T_{1/2}$space, f^{-1}(B) is an IFCS in (X, τ). Hence *f* is an IF continuous. Also,f^{-1}: (Y, σ) → (X, τ) is a IF$_{\tilde{B}}$G continuous. Let A be an IFCS in (X, τ). Then, $(f^{-1})^{-1}$(A) = *f* (A) is an IF$_{\tilde{B}}$GCS in (Y, σ). Since (Y, σ) is an IF$_{\tilde{B}a}T_{1/2}$space, *f* (A) is an IFCS in (Y, σ). f^{-1} is an IF continuous mapping. ∴ the mapping *f* is an IF homeomorphism.

Theorem 3.8: Let *f* : (X, τ) → (Y, σ) be an IF$_{\tilde{B}}$G homeomorphism. Then *f* is an IFG homeomorphism if (X, τ) and (Y, σ) are IF$_{\tilde{B}b}T_{1/2}$ space.
Proof: Let B be an IFCS in (Y, σ). Since *f* is an IF$_{\tilde{B}}$G homeomorphism, f^{-1}(B) is an IF$_{\tilde{B}}$GCS in (X, τ). Since (X, τ) is an IF$_{\tilde{B}b}T_{1/2}$space, f^{-1}(B) is an IFGCS in (X, τ). Hence *f* is an IFG continuous. Also, f^{-1}: (Y, σ) → (X, τ) is an IF$_{\tilde{B}}$G continuous. Let A be an IFCS in (X, τ). Then,$(f^{-1})^{-1}$(A) = *f* (A) is an IF$_{\tilde{B}}$GCS in (Y, σ). Since (Y, σ) is an IF$_{\tilde{B}b}T_{1/2}$space, *f* (A) is an IFGCS in (Y, σ). Hence f^{-1} is an IFG continuous. Therefore, *f* is an IFG homeomorphism.

Theorem 3.9: Let *f* :(X, τ) → (Y, σ) be a bijective mapping. If*f* is an IF$_{\tilde{B}}$G continuous, then the following are equivalent:
(i) *f*is an IF$_{\tilde{B}}$G closed mapping
(ii) *f*is an IF$_{\tilde{B}}$G open mapping
(iii) *f* is an IF$_{\tilde{B}}$G homeomorphism.
Proof: Let*f*: (X, τ) → (Y, σ) be a bijective mapping and *f* be an IF$_{\tilde{B}}$G continuous mapping.
(i) ⇒ (ii): let *f* be an IF$_{\tilde{B}}$G closed mapping. This implies thatf^{-1}: (Y, σ) → (X, τ) is IF$_{\tilde{B}}$G continuous. By proposition 3.3, every IFOS in (X, τ) is an IF$_{\tilde{B}}$GOS in (Y, σ). Hence f^{-1} is an IF$_{\tilde{B}}$G open mapping.
(ii) ⇒ (iii): let *f* be an IF$_{\tilde{B}}$G open mapping. This implies that f^{-1}: (Y, σ) → (X, τ) is IF$_{\tilde{B}}$G continuous. Hence *f* and f^{-1} are IF$_{\tilde{B}}$G continuous. Therefore, *f* is an IF$_{\tilde{B}}$G homeomorphism.
(iii) ⇒ (i): Let *f* is an IF$_{\tilde{B}}$G homeomorphism. Then, *f* and f^{-1} are IF$_{\tilde{B}}$G continuous. By proposition 2.2.3, every IFCS in (X, τ) is an IF$_{\tilde{B}}$GCS in (Y, σ),*f* is an IF$_{\tilde{B}}$G closed mapping.

Remark 3.10: The composition of two IF$_{\tilde{B}}$G homeomorphisms need not be an IF$_{\tilde{B}}$G homeomorphism in general. This can be shown from the following example.

Example 3.11: Let X = {a, b}, Y = { c, d }and Z = { u, v }. Let τ = { $0_\sim$, G_1, $1_\sim$ }, σ = {$0_\sim$, G_2, $1_\sim$ } and η = {$0_\sim$, G_3, $1_\sim$ } where G_1 = ⟨x, (0.81, 0.61), (0.21, 0.41)⟩, G_2 = ⟨ y, (0.61, 0.11), (0.41, 0.31) ⟩ and G_3 = ⟨ z, (0.41, 0.41), (0.61, 0.21) ⟩. *f* and f^{-1} are IF$_{\tilde{B}}$G continuous mappings. Also g and g^{-1} are IF$_{\tilde{B}}$G continuous mappings. Hence *f* and g are IF$_{\tilde{B}}$G homeomorphisms. Except the composition go*f*: (X, τ) → (Z,η) is an IF$_{\tilde{B}}$G homeomorphism since go*f* is not an IF$_{\tilde{B}}$G continuous mapping.

IV. IFi$_{\tilde{B}}$GS homeomorphism

Definition 4.1: A bijection mapping *f*: (X, τ) → (Y,σ) is called an intuitionistic fuzzy iB̃generalized semi homeomorphism (IFi$_{\tilde{B}}$GS homeomorphism in short) if *f* and f^{-1} are IF$_{\tilde{B}}$G irresolute mappings.
We denote the group of all IFi$_{\tilde{B}}$G-homeomorphism of a topological space (X, τ) ontoitself by **IFi$_{\tilde{B}}$G-*h*(X, τ)**.

Theorem 4.2: Every IFi$_{\tilde{B}}$G homeomorphism is an IF$_{\tilde{B}}$G homeomorphism.
Proof: Let f: (X, τ) → (Y, σ) be an IFi$_{\tilde{B}}$GS homeomorphism. Then, f and f^{-1} are IF$_{\tilde{B}}$G irresolute function. By Proposition, every IF$_{\tilde{B}}$G irresolute function is an IF$_{\tilde{B}}$G continuous function. Therefore, f and f^{-1} are IF$_{\tilde{B}}$G continuous function and hence f is an IF$_{\tilde{B}}$G homeomorphism.

Example 4.3: Let X = {a, b}, Y = { u, v } and τ = { $0_\sim$, G_1, $1_\sim$ } and σ = {$0_\sim$, G_2, $1_\sim$ } where G_1 = ⟨ x, (0.31, 0.31), (0.61, 0.61) ⟩ and G_2 = ⟨ y, (0.21, 0.11), (0.41, 0.41) ⟩. $f$is an IF$_{\tilde{B}}$G homeomorphism. The IFS A=⟨ y, (0.31, 0.21), (0.61, 0.61) ⟩ in (Y, σ), Clearly, A is an IF$_{\tilde{B}}$GCS in (Y, σ), except f^{-1}(A) is an IF$_{\tilde{B}}$GCS in (X, τ) and therefore, f is not an IF$_{\tilde{B}}$G irresolute mapping. Hence f is not an IFi$_{\tilde{B}}$G homeomorphism.

Definition 4.4: Let A be an IFS in an IFTS (X, τ). T hen B̃gcl (A) is defined as B̃gcl(A)= ∩ { B / B is an IF$_{\tilde{B}}$GCS in (X, τ) and A ⊆B }.

Theorem 4.5: If f : (X, τ) → (Y, σ) is an IFi$_{\tilde{B}}$G homeomorphism, then B̃gcl(f^{-1}(B)) = f^{-1}(B̃gcl(B)) for every IFS B in (Y, σ).
Proof: Since f is an IFi$_{\tilde{B}}$G homeomorphism, f is an IF$_{\tilde{B}}$G irresolute mapping. Consider an IFS B in (Y, σ). Clearly B̃gcl(B) is an IF$_{\tilde{B}}$GCS in (Y, σ).By hypothesis, f^{-1}(B̃gcl(B)) is an IF$_{\tilde{B}}$GCS in (X, τ). Since f^{-1}(B) ⊆f^{-1}(B̃gcl(B)), B̃gcl(f^{-1}(B)) ⊆B̃gcl(f^{-1}(B̃gcl(B))) = f^{-1}(B̃gcl(B))). This implies B̃gcl(f^{-1}(B))⊆f^{-1}(B̃gcl(B)).
Since f is an IFi$_{\tilde{B}}$G homeomorphism, f^{-1}:(Y, σ) → (X, τ) is an IF$_{\tilde{B}}$G irresolute mapping. Consider an IFS f^{-1}(B) in (X, τ). Clearly B̃gcl(f^{-1}(B)) is an IF$_{\tilde{B}}$GCS in (X, τ). This implies that $(f^{-1})^{-1}$(B̃gcl(f^{-1}(B))) = f(B̃gcl(f^{-1}(B))) is an IF$_{\tilde{B}}$GCS in (Y, σ).
Clearly B = $(f^{-1})^{-1}$(f^{-1}(B))⊆$(f^{-1})^{-1}$(B̃gcl(f^{-1}(B))) = f(B̃gcl(f^{-1}(B))). Therefore, B̃gcl(B)⊆B̃gcl(f(B̃gcl(f^{-1}(B)))) = f(B̃gcl(f^{-1}(B)), sincef^{-1} is an IF$_{\tilde{B}}$G irresolute mapping. Hence f^{-1}(B̃gcl(B))⊆f^{-1}(f(B̃gcl(f^{-1}(B)) = B̃gcl(f^{-1}(B)). That isf^{-1}(B̃gcl(B)) ⊆B̃gcl(f^{-1}(B)).This implies B̃gcl(f^{-1}(B)) = f^{-1}(B̃gcl(B)).

Corollary 4.6: If f : (X, τ) → (Y, σ) is an IFi$_{\tilde{B}}$G homeomorphism, then B̃gcl(f(B)) = f(B̃gcl(B)) for every IFS B in (X, τ).
Proof: Since f is an IFi$_{\tilde{B}}$G homeomorphism, f^{-1} is an IFi$_{\tilde{B}}$G homeomorphism.Let B be an IFS in (X, τ). By theorem, B̃gcl(f(B)) = f(B̃gcl(B)) for every IFS B in (X, τ).

Corollary 4.7: If f : (X, τ) → (Y, σ) is an IFi$_{\tilde{B}}$G homeomorphism, then f (B̃gint(B)) =B̃gint(f (B)) for every IFS B in (X, τ).
Proof : For any IFS B in (X, τ), B̃gint(B) = (B̃gcl(B^c))^c, By Corollary, f (B̃gint(B)) = f(B̃gcl(B^c))^c) = (f(B̃gcl(B^c)))^c = (B̃gcl(f(B^c)))^c. This implies that$f$(B̃gint(B)) = (B̃gcl(f (B))^c)^c = B̃gint(f (B)).

Corollary 4.8: If f : (X, τ) → (Y, σ) is an IFi$_{\tilde{B}}$G homeomorphism, then f^{-1} (int(B)) = int (f^{-1}(B)) for every IFS B in (X, τ).
Proof : Since f^{-1}: (Y, σ) → (X, τ) is also an IFi$_{\tilde{B}}$GS homeomorphism, the proof follows from Corollary 4.7.

Proposition 4.9: If f : (X, τ) → (Y, σ) and g : (Y, σ) → (Z, η) are IFi$_{\tilde{B}}$G homeomorphisms then their composition g of : (X, τ) → (Z, η) is also an IFi$_{\tilde{B}}$G homeomorphisms.
Proof: Let f: (X, τ) → (Y, σ) and g:(Y, σ) → (Z, η)be any two IFi$_{\tilde{B}}$G homeomorphisms. Therefore, f, f^{-1}, g and g^{-1} are IF$_{\tilde{B}}$G irresolute functions. By theorem, g of and (g of)$^{-1}$= f^{-1}og^{-1}areIF$_{\tilde{B}}$GS irresolute functions and (g of) is an IFi$_{\tilde{B}}$G homeomorphism.

Proposition 4.10: The set IFi$_{\tilde{B}}$G-h(X, τ) is a group under the composition of maps.
Proof : Define a binary operation * : IFi$_{\tilde{B}}$G-h(X, τ) x IFi$_{\tilde{B}}$G-h(X, τ) → IFi$_{\tilde{B}}$G-h(X, τ) by f * g = g ∘ f for all f, g ∈ IFi$_{\tilde{B}}$G-h(X, τ) and ∘ is the usual operation of composition of maps.

(i) **Closure Property**: Let f∈IFi$_{\tilde{B}}$G-h(X, τ) and g ∈IFi$_{\tilde{B}}$G-h(X, τ). By theorem 6.3.9, g ∘ f∈ IFi$_{\tilde{B}}$G-h(X, τ).
(ii) **Associative property** : We know that the composition of mappings is associative.
(iii) **Existence of identity** : The identity mappings I : (X, τ) → (X, τ) belonging to IFi$_{\tilde{B}}$G-h(X, τ) servers as the identity element.
(iv) **Existence of inverse** : If f∈ IFi$_{\tilde{B}}$G-h(X, τ), then f^{-1}∈ IFi$_{\tilde{B}}$G-h(X, τ) such that f^{-1} * f = f∘f^{-1}= I. Therefore, inverse exists for each element of IFi$_{\tilde{B}}$G-h(X, τ).

Therefore, (IFi$_{\tilde{B}}$G-h(X, τ) , ∘) is a group under the operation of composition of maps.

Theorem 4.11: Let f: (X, τ) → (Y, σ) be a IFi$_{\tilde{\beta}}$G homeomorphism. Then f induces an isomorphism from the group IFi$_{\tilde{\beta}}$G-*h*(X, τ) onto the group IFi$_{\tilde{\beta}}$G-*h*(Y, σ).

Proof : Let f: (X, τ) → (Y, σ)be a IFi$_{\tilde{\beta}}$G homeomorphism. We define a map θ_f : IFi$_{\tilde{\beta}}$G-*h*(X, τ) → IFi$_{\tilde{\beta}}$G-*h*(Y, σ), by θ_f (h): $f\circ h \circ f^{-1}$ for every h ∈ IFi$_{\tilde{\beta}}$G-*h*(X, τ), using the mapping f.

Obviously, to prove that θ_f is a homeomorphism. $\theta_f (h_1\circ h_2) = f\circ (h_1\circ h_2) \circ f^{-1} = (f\circ h_1)\circ(h_2\circ f^{-1}) = (f\circ h_1) \circ(f^{-1}\circ f) \circ (h_2\circ f^{-1}) = (f\circ h_1\circ f^{-1}) \circ (f\circ h_2\circ f^{-1}) = \theta_f (h_1) \circ \theta_f (h_2)$,for all $h_1,h_2 \in$ IFi$_{\tilde{\beta}}$G-*h*(X, τ). Therefore, θ_f is a homeomorphism. Hence f induces an isomorphism from the group IFi$_{\tilde{\beta}}$G-*h*(X, τ) onto the group IFi$_{\tilde{\beta}}$G-*h*(Y, σ).

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