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Fuzzy gc-super Irresolute Mappings

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***Abstract*: -** In this paper we study the concept of fuzzy gc-super irresolute mappings and introduced some of their basic properties in fuzzy topology.

Keywords: - *fuzzy super closure ,fuzzy super interior, fuzzy super closed set, fuzzy super open set ,fuzzy super continuity ,fuzzy g -super closed sets and fuzzy g –super open sets, fuzzy g -super continuous mappings.*

I. INTRODUCTION

After the introduction of fuzzy sets by Zadeh [15] in 1965 and fuzzy topology by chang [4] in 1967. Several researches were conducted on the generalizations of the notions of fuzzy sets and fuzzy topology. The concept of fuzzy sets was introduced by Atanassov [1] as a generalization of fuzzy sets . In the last 20 years various concepts of fuzzy mathematics have been extended for fuzzy sets. In 1997 Coker [5] introduced the concept of fuzzy topological spaces. Recently many fuzzy topological concepts such as fuzzy compactness [8], fuzzy connectedness [14], fuzzy multi functions [9] fuzzy g -super closed set [11] and fuzzy g -super continuity [12] have been generalized for fuzzy topological spaces. Topological space. In the present paper we introduce and study the concept of fuzzy gc-super irresolute mappings in fuzzy topological space.

II. PRELIMINARIES

Definition 2.1[8,9,12]**:** A fuzzy set A of a fuzzy topological space $(X,\Im)$ is called a

(a) fuzzy generalized super closed (fuzzy g -super closed) if $cl(A) \leq O$ Whenever $A \leq O$ and O is fuzzy super open.

(b) Fuzzy generalized super open if its complement is fuzzy generalized super closed.

Remark 2.1 [8,9,12]**:** Every fuzzy super closed set is fuzzy g -super closed set but its converse may not be true.

Definition 2.2[9]: Let $(X,\Im)$ and (Y,Φ) be two fuzzy topological spaces and let $f: X\rightarrow Y$ be a function. Then

(a) f is said to be fuzzy super continuous if the pre image of each fuzzy open set in Y is an fuzzy super open set in X.[8]

(b) f is said to be fuzzy g -super continuous if the inverse image of every fuzzy super closed set of Y is fuzzy g -super closed set in X.[13]

Definition 2.3[8,9,13]: An fuzzy topological space X is called fuzzy g -super connected if there is no proper fuzzy set of X which is both fuzzy g -super open and fuzzy g -super closed.

Definition 2.4[8,9,13]: An fuzzy set B of a fuzzy topological space $(X,\Im)$ is said to be fuzzy GO- super compact relative to X, if for every collection $\{A_i: i\in\wedge\}$ of fuzzy g –super open sets of X such that $B \leq \cup\{A_i: i\in\wedge\}$. There exists a finite subset $\wedge_0$ of $\wedge$ such that $B \leq \cup\{A_i: i\in\wedge_0\}$.

Definition 2.5[8,9,13] : A crisp subset Y of an fuzzy topological space $(X,\Im)$ is said to be fuzzy GO- super compact if Y is fuzzy GO- super compact as a fuzzy subspace of X.

Definition 2.6.[8,9,13]: Let (X, $\Im$) be an fuzzy topological space. The generalized closure of a fuzzy set A of X denoted by gcl(A) is the intersection of all fuzzy g -super closed sets of X which contains A.

III. FUZZY GC-SUPER IRRESOLUTE MAPPINGS

Definition 3.1: A mapping f from an fuzzy topological space (X,$\Im$) to another fuzzy topological space (Y,σ) is said to be fuzzy gc-super irresolute if the inverse image of every fuzzy g -super closed set of Y is fuzzy g -super closed in X.

Theorem 3.1: A mapping f : (X,$\Im$)$\rightarrow$(Y,σ) is fuzzy gc-super irresolute if and only if the inverse image of every fuzzy g –super open set in Y is fuzzy g -super open in X.

Proof: It is obvious because $f^{-1}(U^c) = (f^{-1}(U))^c$, for every fuzzy set U of Y.

Remark 3.1: Since every fuzzy closed set is fuzzy g -super closed it is clear that every fuzzy gc-super irresolute mapping is fuzzy g -super continuous but the converse may not be true.

Remark 3.2: Example (3.1) and example (3.2) asserts that the concepts of fuzzy gc-super irresolute and fuzzy super continuous mappings are independent.

Theorem 3.2: If a mapping f : (X,$\Im$)$\rightarrow$(Y,σ) is fuzzy gc-super irresolute then

(a) f(gcl(A)) $\leq$gcl(f(A)

(b) gcl(f^{-1}(B)) $\leq$ f^{-1}(gcl(B)).

Proof: Obvious.

Theorem 3.3: Let f: (X,$\Im$)$\rightarrow$(Y,σ) is bijective fuzzy super open and fuzzy g -super continuous then f is fuzzy gc- super irresolute.

Proof: Let A be a fuzzy g -super closed set in Y and let $f^{-1}(A) \leq G$ where G is fuzzy open set in X. Then A $\leq$ f(G). Since f(G) is fuzzy super open and A is fuzzy g -super closed in Y, cl(A) $\leq$ f(G) and f^{-1}(cl(A)) $\leq$G. Since f is fuzzy g -super continuous and cl(A) is fuzzy super closed in Y, cl(f^{-1}(cl(A))) $\leq$ G. And so cl(f^{-1}(A)) $\leq$ G. Therefore f^{-1}(A) is fuzzy g -super closed in X. Hence f is fuzzy gc- super irresolute.

Theorem 3.4: Let f : (X,$\Im$)$\rightarrow$(Y,σ) and g: (Y,σ)$\rightarrow$(Z,η) be two fuzzy gc-super irresolute mappings, then gof : (X,$\Im$)$\rightarrow$(Z, η) is fuzzy gc- super irresolute.

Proof : Obvious.

Theorem 3.5: Let f : (X,$\Im$) $\rightarrow$ (Y,σ) is fuzzy gc-super irresolute and g: (Y,σ)$\rightarrow$(Z,η) is fuzzy g -super continuous then the gof : (X,$\Im$)$\rightarrow$(Z, η) is fuzzy g -super continuous.

Proof: Obvious.

Theorem 3.6: Let f : (X,$\Im$)$\rightarrow$(Y,σ) is fuzzy gc-super irresolute mappings, then gof : (X,$\Im$)$\rightarrow$(Z, η) is fuzzy gc-super irresolute and if B is fuzzy GO- super compact relative to X, then the image f(B) is fuzzy GO- super compact relative to Y.

Proof : Let {Ai: i$\in\wedge$}be any collection of fuzzy g–super open set of Y such that f(B) $\leq$ $\cup${Ai: i$\in\wedge$}. Then B $\leq$ $\cup${f^{-1}(Ai): i$\in\wedge$}. By using the assumption, there exists a finite subset $\wedge_0$ of $\wedge$ such that B $\leq$ $\cup${f^{-1}(Ai): i$\in\wedge_0$}. Therefore, f(B) $\leq${Ai: i$\in\wedge_0$}. Which shows that f(B) is fuzzy GO- super compact relative to Y.

Corollary 3. 1: A fuzzy gc-super irresolute image of a fuzzy GO- super compact space is fuzzy GO- super compact.

Theorem 3.8: Let (XxY, $\Im$xσ) be the fuzzy product space of non-empty fuzzy topological spaces (X,$\Im$) and (Y,σ). Then the projection mapping p: XxY$\rightarrow$X is fuzzy gc- super irresolute.

Proof: Let F be any fuzzy g -super closed set of X. Then $fx_1(= p^{-1}(F))$ is fuzzy g -super closed and hence p is fuzzy gc- super irresolute.

Theorem 3.9: If the product space (XxY, $\Im$xσ) of two non empty fuzzy topological spaces (X,$\Im$) and (Y,σ) is fuzzy GO-super compact, then each factor space is fuzzy GO- super compact.

Proof: Obvious.

Theorem: 3.10: Let f : (X,$\Im$)$\rightarrow$(Y,σ) is an fuzzy gc-super irresolute surjection and (X,$\Im$) is fuzzy GO- super connected, then (Y,σ) is fuzzy GO- super connected.

Proof: Suppose Y is not fuzzy GO- super connected then there exists a proper fuzzy set G of Y which is both fuzzy g -super open and Fuzzy g -super closed, therefore f^{-1}(G) is a proper fuzzy set of X, which is both fuzzy g -super open and fuzzy g -super closed, because f is fuzzy g -super continuous surjection. Therefore X is not fuzzy GO- super connected, which is a contradiction. Hence Y is fuzzy GO- super connected.

Theorem 3.11: If the product space (XxY ,$\Im$xσ) of two non-empty fuzzy topological spaces (X,$\Im$) and (Y,σ) is fuzzy GO- super connected, then each factor fuzzy space is fuzzy GO- super connected.

Proof: Obvious.

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