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Fuzzy rg-Super Irresolute Mapping

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***Abstract**: In this paper the concept of fuzzy rg -super irresolute mappings have been introduced and explore some of its basic properties in fuzzy Topological Space.*
***Keywords**: fuzzy topology, fuzzy super closure, Fuzzy Super Interior fuzzy rg-super closed sets and fuzzy rg-super open sets, fuzzy rg-super continuous and fuzzy rg -super irresolute mappings.*

I. Preliminaries

Let X be a non empty set and I= [0,1]. A fuzzy set on X is a mapping from X in to I. The null fuzzy set 0 is the mapping from X in to I which assumes only the value is 0 and whole fuzzy sets 1 is a mapping from X on to I which takes the values 1 only. The union (resp. intersection) of a family $\{A_\alpha: \alpha\in\Lambda\}$of fuzzy sets of X is defined by to be the mapping sup A_α (resp. inf A_α) . A fuzzy set A of X is contained in a fuzzy set B of X if $A(x) \le B(x)$ for each $x\in X$. A fuzzy point x_β in X is a fuzzy set defined by $x_\beta (y)=\beta$ for y=x and x(y) =0 for $y \neq x$, $\beta\in[0,1]$ and $y \in X$ .A fuzzy point x_β is said to be quasi-coincident with the fuzzy set A denoted by $x_{\beta q}A$ if and only if $\beta + A(x) > 1$. A fuzzy set A is quasi coincident with a fuzzy set B denoted by A_qB if and only if there exists a point $x\in X$ such that $A(x) + B(x) > 1$.$A \le B$ if and only if $\rceil(A_qB^c)$.A family τ of fuzzy sets of X is called a fuzzy topology [2] on X if 0,1 belongs to τ and τ is super closed with respect to arbitrary union and finite intersection .The members of τ are called fuzzy super open sets and their complement are fuzzy super closed sets. For any fuzzy set A of X the closure of A (denoted by cl(A)) is the intersection of all the fuzzy super closed super sets of A and the interior of A (denoted by int(A))is the union of all fuzzy super open subsets of A.

Defination1.1 [5,10,11,12]: Let (X,τ) fuzzy topological space and $A\le X$ then
1. Fuzzy Super closure $scl(A)=\{x\in X:cl(U)\cap A\neq\phi\}$
2. Fuzzy Super interior $sint(A) =\{x\in X:cl(U)\le A\neq\phi\}$

Definition 1.2[5, 10,11,12]: A fuzzy set A of a fuzzy topological space (X,τ) is called:
(a) Fuzzy super closed if $scl(A) \le A$.
(b) Fuzzy super open if 1-A is fuzzy super closed sint(A)=A

Remark 1.1[5, 10,11,12]: Every fuzzy closed set is fuzzy super closed but the converses may not be true.
Remark 1.2[5, 10,11,12]: Let A and B are two fuzzy super closed sets in a fuzzy topological space $(X,\Im)$, then $A \cup B$ is fuzzy super closed.
Remark 1.3[5]: The intersection of two fuzzy super closed sets in a fuzzy topological space $(X,\Im)$ may not be fuzzy super closed.
Definition 1.3: A fuzzy set A of an fuzzy topological space $(X, \Im)$ is said to be :-
(a) fuzzy regular super open if A = int(cl(A)) [7].
(b) fuzzy g-super closed if $cl(A)\le O$ whenever $A\le O$ and O is an fuzzy super open set.[14]
(c) fuzzy g-super open if A^c is fuzzy g-closed.[14]
(d) fuzzy rg-super closed if $cl(A) \le O$ whenever $A\le O$ and O is an fuzzy regular super open set.[16]
(e) fuzzy rg-super open if A^c is fuzzy rg-closed.[16]

Remark 1.3: Every fuzzy super closed set is fuzzy g-super closed and every fuzzy g-super closed set is fuzzy rg-super closed but the converse may not be true.[14,16]
Definition 1.4: A mapping $f : (X,\Im)\to(Y,\sigma)$ is said to be :
1. Fuzzy g-super continuous if the pre image of every fuzzy super closed set of Y is fuzzy g-super closed in X.[15].
2. Fuzzy rg-super continuous if the pre image of every fuzzy super closed set of Y is fuzzy rg-super closed in X. [17]

Remark 1.4: Every fuzzy super continuous mapping is fuzzy g-super continuous and every fuzzy g-super continuous mapping is fuzzy rg-super continuous but the converse may not be true.[17]
Definition 1.5: A collection $\{G_\alpha:\alpha\in\wedge\}$ of fuzzy rg-super open sets in a fuzzy topological space $(X,\Im)$ is called a fuzzy rg-super open cover of an fuzzy set A of X if $A \le\cup\{G_\alpha:\alpha\in\wedge\}$.[16]
Definition 1.6: A fuzzy topological space $(X,\Im)$ is said to be fuzzy rg- super compact if every fuzzy rg-super open cover of X has a finite subcover.[16]

Definition 1.7: An fuzzy set A of an fuzzy topological space $(X,\Im)$ is said to be fuzzy rg- super compact relative to X if every collection $\{G_\alpha:\alpha\in\wedge\}$ of fuzzy rg-super open subsets of X such that $A \leq \cup\{G_\alpha:\alpha\in\wedge\}$there exists a finite subset $\wedge_0$ such that $A \leq \cup\{G_{\alpha j}: \alpha_j\in\wedge_0\}$.[16]

Definition 1.8: A fuzzy topological space X is fuzzy rg-connected if there is no proper fuzzy set of X which is both fuzzy rg-super open and fuzzy rg-closed.[17]

II. Fuzzy rg -super irresolute Mappings

Definition 2.1: A mapping f from a fuzzy topological space $(X,\Im)$ to another fuzzy topological space (Y,σ) is said to be fuzzy rg -super irresolute if the pre image of every fuzzy rg-super closed set of Y is fuzzy rg-super closed in X.

Theorem 2.1: A mapping $f : (X,\Im)\rightarrow(Y,\sigma)$ is fuzzy rg -super irresolute if and only if the pre image of every fuzzy rg-super open set in Y is fuzzy rg-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 2.1: Every fuzzy g-super closed set is fuzzy rg-super closed it is clear that every fuzzy rg -super irresolute mapping is fuzzy rg-super continuous but the converse may not be true.

Definition 2.2: A mapping $f : (X,\Im)\rightarrow(Y,\sigma)$ is said to be fuzzy regular super open if the image of every fuzzy regular super open set of X is fuzzy regular super open set in Y.

Theorem 2.2: Let $f :(X,\Im)\rightarrow(Y,\sigma)$ is bijective fuzzy regular super open and fuzzy rg-super continuous then f is fuzzy rg- super irresolute.

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

Theorem 2.3: Let $f : (X,\Im)\rightarrow(Y,\sigma)$ and $g: (Y,\sigma)\rightarrow(Z,\eta)$ be two fuzzy rg -super irresolute mappings, then $gof : (X,\Im)\rightarrow(Z, \eta)$ is fuzzy rg- super irresolute.

Proof : Obvious.

Theorem 2.4: Let $f : (X,\Im)\rightarrow(Y,\sigma)$ is fuzzy rg -super irresolute mapping, and if B is fuzzy rg- super compact relative to X, then the image f(B) is fuzzy rg- super compact relative to Y.

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

Theorem 2.5: A fuzzy rg -super irresolute image of a fuzzy rg- super compact space is fuzzy rg-compact.

Proof: Obvious.

Theorem 2.6: If the product space $(XxY, \Im x\sigma)$ of two non- empty fuzzy topological spaces $(X,\Im)$ and (Y,σ) is fuzzy rg- super compact, then each factor space is fuzzy rg- super compact.

Proof: Obvious.

Theorem: 2.7:: Let $f : (X,\Im)\rightarrow(Y,\sigma)$ is a fuzzy rg -super irresolute surjection and $(X,\Im)$ is fuzzy rg- super connected, then (Y,σ) is fuzzy rg- super connected.

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

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