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A Study on (I,V)-Intuitionistic Fuzzy Rw-Continuous Maps and (I,V)-Intuitionistic Fuzzy Rw-Irresolute Maps in (I,V)-Intuitionistic Fuzzy Topological Space

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ABSTRACT

In this paper, we study some of the properties of interval valued intuitionistic fuzzy rw-continuous maps and interval valued intuitionistic fuzzy rw-irresolute maps in interval valued intuitionistic fuzzy topological spaces and prove some results on these. Note interval valued is denoted as (i,v). 2000 AMS SUBJECT CLASSIFICATION: 03F55, 08A72, 20N25.

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INTRODUCTION: The concept of a fuzzy subset was introduced and studied by L.A.Zadeh [23] in the year 1965. The subsequent research activities in this area and related areas have found applications in many branches of science and engineering. The following papers have motivated us to work on this paper. C.L.Chang [6] introduced and studied fuzzy topological spaces in 1968 as a generalization of topological spaces. Many researchers like R.H.Warren [22], K.K.Azad [3], G.Balasubramanian and P.Sundaram [4, 5], S.R.Malghan and S.S.Benchalli [14, 15] and many others have contributed to the development of fuzzy topological spaces. Tapas kumar mondal and S.K.Samanta [20] have introduced the topology of interval valued fuzzy sets. We introduce the concept of interval valued intuitionistic fuzzy rw-continuous map and interval valued intuitionistic fuzzy rw-irresolute map in interval valued intuitionistic fuzzy topological spaces and established some results.

1.PRELIMINARIES:

1.1 Definition:[20] Let X be any nonempty set. A mapping $\bar{A}: X \to D[0,1]$ is called an interval valued fuzzy subset (briefly, (i,v)-fuzzy subset) of X, where D[0,1] denotes the family of all closed subintervals of [0,1] and $\bar{A}(x) = [A^-(x), A^+(x)]$ for all $x \in X$, where A^- and A^+ are fuzzy subsets of X such that $A^-(x) \le A^+(x)$ for all $x \in X$. Thus $\bar{A}(x)$ is an interval (a closed subset of [0,1]) and not a number from the interval [0,1] as in the case of fuzzy subset.

1.2 Definition:[20] Let X be a set and $\Im$ be a family of (i,v)-fuzzy subsets of X. The family $\Im$ is called an (i,v)-fuzzy topology on X if and only if $\Im$ satisfies the following axioms (i) $\bar{0}$, $\bar{1} \in \Im$, (ii) If { $\bar{A}_i$; i∈I} ∈ $\Im$, then $\cup_{i \in I} \bar{A}_i \in \Im$, (iii) If $\bar{A}_1$, $\bar{A}_2$, $\bar{A}_3$, ….. $\bar{A}_n \in \Im$, then $\cap_{i=1}^{n} \bar{A}_i \in \Im$. The pair (X, $\Im$) is called an (i,v)-fuzzy topological space. The members of $\Im$ are called (i,v)-fuzzy open sets in X. An (i,v)-fuzzy set $\bar{A}$ in X is said to be (i,v)-fuzzy closed set in X if and only if ($\bar{A}$)^c is an (i,v)-fuzzy open set in X.

1.3 Definition: An interval valued intuitionistic fuzzy subset(IVIFS) $\bar{A}$ of a set X is defined as an object of the form $\bar{A}$ = { ⟨x, $\bar{\mu}_A(x)$, $\bar{\nu}_A(x)$ ñ / xÎX}, where $\bar{\mu}_A$:X→D[0, 1] and $\bar{\nu}_A$: X →D[0, 1] define the degree of membership and the degree of non-membership of the element x in X respectively and for every x in X satisfying 0 + sup $\bar{\mu}_A(x)$ + sup $\bar{\nu}_A(x) \le 1$.

1.4 Definition: Let $\bar{A}$ and $\bar{B}$ be any two (i,v)-intuitionistic fuzzy subsets of a set X. We define the following relations and operations:

(i) $\bar{A} \subseteq \bar{B}$ if and only if $\bar{\mu}_A(x) \le \bar{\mu}_B(x)$ and $\bar{\nu}_A(x) \ge \bar{\nu}_B(x)$, for all x in X.

(ii) $\bar{A} = \bar{B}$ if and only if $\bar{\mu}_A(x) = \bar{\mu}_B(x)$ and $\bar{\nu}_A(x) = \bar{\nu}_B(x)$, for all x in X.

(iii) $(\bar{A})^c$ = { ⟨ x, $\bar{\nu}_A(x)$, $\bar{\mu}_A(x)$ ⟩ / x∈X }.

(iv) $\bar{A} \cap \bar{B}$ = { ⟨ x, min{ $\bar{\mu}_A(x)$, $\bar{\mu}_B(x)$ }, max{ $\bar{\nu}_A(x)$, $\bar{\nu}_B(x)$ } ⟩ / x∈X }.

(v) `AÈ`B = { á x, max {`mA(x),`mB(x) }, min{`nA(x),`nB(x) } ñ / xÎX }.

1.1 Remark: The (i,v)-intuitionistic fuzzy subsets $\bar{0}$ = { < x, [0, 0], [1,1] > : *x*∈*X* } and $\bar{1}$ = { < x, [1, 1], [0, 0] > : *x*∈*X* } are respectively called (i,v)-intuitionistic fuzzy empty and whole (i,v)-intuitionistic fuzzy subset on X.

1.5 Definition: Let X be a set and $\Im$ be a family of (i,v)-intuitionistic fuzzy subsets of X. The family $\Im$ is called an (i,v)-intuitionistic fuzzy topology on X if and only if $\Im$ satisfies the following axioms (i) $\bar{0}$, $\bar{1} \in \Im$, (ii) If { $\bar{A}_i$; i∈I} ⊆ $\Im$, then $\cup_{i \in I} \bar{A}_i \in \Im$, (iii) If $\bar{A}_1$, $\bar{A}_2$, $\bar{A}_3$,…… $\bar{A}_n \in \Im$, then $\cap_{i=1}^{n} \bar{A}_i \in \Im$. The pair (X, $\Im$) is called an (i,v)-intuitionistic fuzzy topological space. The members of $\Im$ are called (i,v)-intuitionistic fuzzy open sets in X. An (i,v)-intuitionistic fuzzy set $\bar{A}$ in X is said to be (i,v)-intuitionistic fuzzy closed set in X if and only if $\bar{A}^c$ is an (i,v)-intuitionistic fuzzy open set in X.

1.6 Definition: Let (X, $\Im$) be an (i,v)-intuitionistic fuzzy topological space and $\bar{A}$ be an (i,v)-intuitionistic fuzzy set in X. Then ∩{ $\bar{B}$: $\bar{B}^c \in \Im$ and $\bar{B} \subseteq \bar{A}$ } is called (i,v)-intuitionistic fuzzy closure of $\bar{A}$ and is denoted by cl($\bar{A}$).

1.7 Definition: Let (X, $\Im$) be an (i,v)-intuitionistic fuzzy topological space and $\bar{A}$ be an (i,v)-intuitionistic fuzzy set in X. Then ∪{ $\bar{B}$: $\bar{B} \in \Im$ and $\bar{B} \subseteq \bar{A}$ } is called (i,v)-intuitionistic fuzzy interior of A and is denoted by int(A).

1.8 Definition: Let (X, $\Im$) be an (i,v)-intuitionistic fuzzy topological space and $\bar{A}$ be (i,v)-intuitionistic fuzzy set in X. Then $\bar{A}$ is said to be

(i) (i,v)-intuitionistic fuzzy semiopen if and only if there exists an (i,v)-intuitionistic fuzzy open set $\bar{V}$ in X such that $\bar{V} \subseteq \bar{A} \subseteq cl(\bar{V})$.

(ii) (i,v)-intuitionistic fuzzy semiclosed if and only if there exists an (i,v)-intuitionistic fuzzy closed set $\bar{V}$ in X such that $int(\bar{V}) \subseteq \bar{A} \subseteq \bar{V}$.

(iii) (i,v)-intuitionistic fuzzy regular open set of X if $int(cl(\bar{A})) = \bar{A}$.

(iv) (i,v)-intuitionistic fuzzy regular closed set of X if $cl(int(\bar{A})) = \bar{A}$.

(v) (i,v)-intuitionistic fuzzy regular semiopen set of X if there exists an (i,v)-intuitionistic fuzzy regular open set $\bar{V}$ in X such that $\bar{V} \subseteq \bar{A} \subseteq cl(\bar{V})$. We denote the class of (i,v)-intuitionistic fuzzy regular semiopen sets in (i,v)-intuitionistic fuzzy topological space X by IVIFRSO(X).

(vi) (i,v)-intuitionistic fuzzy generalized closed (ivifg-closed) if $cl(\bar{A}) \subseteq \bar{V}$ whenever $\bar{A} \subseteq \bar{V}$ and $\bar{V}$ is (i,v)-intuitionistic fuzzy open set and $\bar{A}$ is (i,v)-intuitionistic fuzzy generalized open set if $\bar{A}^c$ is (i,v)-intuitionistic fuzzy generalized closed.

(vii) (i,v)-intuitionistic fuzzy rg-closed if $cl(\bar{A}) \subseteq \bar{V}$ whenever $\bar{A} \subseteq \bar{V}$ and $\bar{V}$ is (i,v)-intuitionistic fuzzy regular open set in X.

(viii) (i,v)-intuitionistic fuzzy rg-open if its complement $\bar{A}^c$ is (i,v)-intuitionistic fuzzy rg-closed set in X.

(ix) (i,v)intuitionistic fuzzy w-closed if $cl(\bar{A}) \subseteq \bar{V}$ whenever $\bar{A} \subseteq \bar{V}$ and $\bar{V}$ is (i,v)-intuitionistic fuzzy semi open set in X.

(x) (i,v)-intuitionistic fuzzy w-open if its complement $\bar{A}^c$ is (i,v)-intuitionistic fuzzy w-closed set in X.

(xi) (i,v)-intuitionistic fuzzy gpr-closed if $pcl(\bar{A}) \subseteq \bar{V}$ whenever $\bar{A} \subseteq \bar{V}$ and $\bar{V}$ is (i,v)-intuitionistic fuzzy regular open set in X.

(xii) (i,v)-intuitionistic fuzzy gpr-open if its complement $\bar{A}^c$ is (i,v)-intuitionistic fuzzy gpr-closed set in X.

1.1 Theorem: Let $(X, \Im)$ be an (i,v)-intuitionistic fuzzy topological space and $\bar{A}$ be (i,v)-intuitionistic fuzzy set in X. Then the following conditions are equivalent:

(i) $\bar{A}$ is (i,v)-intuitionistic fuzzy regular semiopen

(ii) $\bar{A}$ is both (i,v)-intuitionistic fuzzy semiopen and (i,v)-intuitionistic fuzzy semi-closed.

(iii) $\bar{A}^c$ is (i,v)-intuitionistic fuzzy regular semiopen in X.

1.9 Definition: Let $(X, \Im)$ be an (i,v)-intuitionistic fuzzy topological space. An (i,v)-intuitionistic fuzzy set $\bar{A}$ of X is called (i,v)-intuitionistic fuzzy regular w-closed (briefly, ivifrw-closed) if $cl(\bar{A}) \subseteq \bar{U}$ whenever $\bar{A} \subseteq \bar{U}$ and $\bar{U}$ is (i,v)-intuitionistic fuzzy regular semiopen in (i,v)-intuitionistic fuzzy topological space X.

1.1 NOTE: We denote the family of all (i,v)-intuitionistic fuzzy regular w-closed sets in (i,v)-intuitionistic fuzzy topological space X by IVIFRWC(X).

1.10 Definition: An (i,v)-intuitionistic fuzzy set $\bar{A}$ of an (i,v)-intuitionistic fuzzy topological space X is called an (i,v)-intuitionistic fuzzy regular w-open (briefly, ivifrw-open) set if its complement $\bar{A}^C$ is an (i,v)-intuitionistic fuzzy rw-closed set in (i,v)-intuitionistic fuzzy topological space X.

1.2 NOTE: We denote the family of all (i,v)-intuitionistic fuzzy rw-open sets in (i,v)-intuitionistic fuzzy topological space X by IVIFRWO(X).

1.11 Definition: A mapping $f : X \longrightarrow Y$ from an (i,v)-intuitionistic fuzzy topological space X to an (i,v)-intuitionistic fuzzy topological space Y is called

(i) (i,v)-intuitionistic fuzzy continuous if $f^{-1}(\bar{A})$ is (i,v)-intuitionistic fuzzy open in X for each (i,v)-intuitionistic fuzzy open set $\bar{A}$ in Y.

(ii) (i,v)-intuitionistic fuzzy generalized continuous (ivifg-continuous) if $f^{-1}(\bar{A})$ is (i,v)-intuitionistic fuzzy generalized closed in X for each (i,v)-intuitionistic fuzzy closed set $\bar{A}$ in Y.

(iii) (i,v)-intuitionistic fuzzy semi continuous if $f^{-1}(\bar{A})$ is (i,v)-intuitionistic fuzzy semiopen in X for each (i,v)-intuitionistic fuzzy open set $\bar{A}$ in Y.

(iv) (i,v)-intuitionistic fuzzy almost continuous if $f^{-1}(\bar{A})$ is (i,v)-intuitionistic fuzzy open in X for each (i,v)-intuitionistic fuzzy regular open set $\bar{A}$ in Y.

(v) (i,v)-intuitionistic fuzzy irresolute if $f^{-1}(\bar{A})$ is (i,v)-intuitionistic fuzzy semiopen in X for each (i,v)-intuitionistic fuzzy semiopen set $\bar{A}$ in Y.

(vi) (i,v)-intuitionistic fuzzy gc-irresolute if $f^{-1}(\bar{A})$ is (i,v)-intuitionistic fuzzy generalized closed in X for each (i,v)-intuitionistic fuzzy generalized closed set $\bar{A}$ in Y.

(vii) (i,v)-intuitionistic fuzzy completely semi continuous if and only if $f^{-1}(\bar{A})$ is an (i,v)-intuitionistic fuzzy regular semiopen set of X for every (i,v)-intuitionistic fuzzy open set of $\bar{A}$ in Y.

(viii) (i,v)-intuitionistic fuzzy w-continuous if and only if $f^{-1}(\bar{A})$ is an (i,v)-intuitionistic fuzzy w-closed set of X for every (i,v)-intuitionistic fuzzy closed of $\bar{A}$ in Y.

(ix) (i,v)-intuitionistic fuzzy rg-continuous if $f^{-1}(\bar{A})$ is (i,v)-intuitionistic fuzzy rg-closed in X for each (i,v)-intuitionistic fuzzy closed set $\bar{A}$ in Y.

(x) (i,v)-intuitionistic fuzzy gpr-continuous if $f^{-1}(\bar{A})$ is (i,v)-intuitionistic fuzzy gpr-closed in X for each (i,v)-intuitionistic fuzzy closed set $\bar{A}$ in Y.

(xi) (i,v)-intuitionistic fuzzy almost-irresolute if $f^{-1}(\bar{A})$ is (i,v)-intuitionistic fuzzy semi open in X for each (i,v)-intuitionistic fuzzy regular semi open set $\bar{A}$ in Y.

(xii) (i,v)-intuitionistic fuzzy rw-continuous if $f^{-1}(\bar{A})$ is (i,v)-intuitionistic fuzzy rw-open in X for each (i,v)-intuitionistic fuzzy open set $\bar{A}$ in Y.

(xiii) (i,v)-intuitionistic fuzzy rw-irresolute if $f^{-1}(\bar{A})$ is (i,v)-intuitionistic fuzzy rw-open in X for each (i,v)-intuitionistic fuzzy rw-open set $\bar{A}$ in Y.

1.14 Definition: Let $(X, \Im)$ be an (i,v)-intuitionistic fuzzy topological space and $\bar{A}$ be an (i,v)-intuitionistic fuzzy set of X. Then (i,v)-intuitionistic fuzzy rw-interior and (i,v)-intuitionistic fuzzy rw-closure of $\bar{A}$ are defined as follows.

$ivifrwcl(\bar{A}) = \cap\{\bar{K} : \bar{K}$ is an (i,v)-intuitionistic fuzzy rw-closed set in X and $\bar{A} \subseteq \bar{K}\}$.

$ivifrwint(\bar{A}) = \cup\{\bar{G} : \bar{G}$ is an (i,v)-intuitionistic fuzzy rw-open set in X and $\bar{G} \subseteq \bar{A}\}$.

1.15 Definition: A mapping $f : X \longrightarrow Y$ from an (i,v)-intuitionistic fuzzy topological space X to an (i,v)-intuitionistic fuzzy topological space Y is called

(i) (i,v)-intuitionistic fuzzy open mapping if $f(\bar{A})$ is (i,v)-intuitionistic fuzzy open in Y for every (i,v)-intuitionistic fuzzy open set in $\bar{A}$ in X.

(ii) (i,v)-intuitionistic fuzzy semiopen mapping if $f(\bar{A})$ is (i,v)-intuitionistic fuzzy semiopen in Y for every (i,v)-intuitionistic fuzzy open set in $\bar{A}$ in X.

2. SOME PROPERTIES:

2.1 Remark: It is clear thatA $\subseteq$ ivifrwcl(A) Í cl(A) for any (i,v)-intuitionistic fuzzy setA.

2.1 Theorem: If a map $f : (X, \Im) \longrightarrow (Y, \sigma)$ is an (i,v)-intuitionistic fuzzy continuous, then f is an (i,v)-intuitionistic fuzzy rw-continuous.

Proof: Let $\bar{A}$ be an (i,v)-intuitionistic fuzzy open set in an (i,v)-intuitionistic fuzzy topological space Y. Since f is (i,v)-intuitionistic fuzzy continuous, $f^{-1}(\bar{A})$ is an (i,v)-intuitionistic fuzzy open set in (i,v)-intuitionistic fuzzy topological space X. As every (i,v)-intuitionistic fuzzy open set is (i,v)-intuitionistic fuzzy rw-open, we have $f^{-1}(\bar{A})$ is (i,v)-intuitionistic fuzzy rw-open set in (i,v)-intuitionistic fuzzy topological space X. Therefore f is (i,v)-intuitionistic fuzzy rw-continuous.

2.2 Remark: The converse of the above Theorem need not be true in general.

2.1 Example: Let X = Y = { 1, 2, 3} and the (i,v)-intuitionistic fuzzy sets $\bar{A} = \langle x, \mu_A, \gamma_A \rangle$, $\bar{B} = \langle x, \mu_B, \gamma_B \rangle$, $\bar{C} = \langle x, \mu_C, \gamma_C \rangle$ are defined as $\bar{A}$ ={ < 1, [1, 1], [0, 0] >, < 2, [0, 0], [1, 1] >, < 3, [0, 0], [1, 1]> }, $\bar{B}$ ={ < 1, [0, 0], [1, 1]>, <2, [1, 1], [0, 0]>, <3, [0, 0], [1, 1]> }, $\bar{C}$ ={ <1, [0, 0], [1, 1] >, <2, [1, 1], [0, 0] >, <3, [1, 1], [0, 0]>}. Consider $\Im$ = { $\bar{0}$, $\bar{1}$, $\bar{A}$}, σ ={ $\bar{0}$, $\bar{1}$, $\bar{B}$, $\bar{C}$}. Now (X, $\Im$) and (Y, σ) are the (i,v)-intuitionistic fuzzy topological spaces. Define a map f : (X, $\Im$)⟶ (Y, σ) by f(1) = 2, f(2) = 3 and f(3) = 1. Then f is (i,v)-intuitionistic fuzzy rw-continuous but not (i,v)-intuitionistic fuzzy continuous as the inverse image of the (i,v)-intuitionistic fuzzy set $\bar{C}$ in (Y, σ) is $\bar{D}$ = ⟨x, $\bar{\mu}_D$, $\bar{\gamma}_D$⟩ define as $\bar{D}$ ={ <1, [1, 1], [0, 0] >, <2, [1, 1], [0, 0]>, <3, [0, 0], [1, 1]> }. This is not an (i,v)-intuitionistic fuzzy open set in (X, $\Im$).

2.2 Theorem: A map f : (X, $\Im$) ⟶ (Y, σ) is (i,v)-intuitionistic fuzzy rw-continuous if and only if the inverse image of every (i,v)-intuitionistic fuzzy closed set in an (i,v)-intuitionistic fuzzy topological space Y is an (i,v)-intuitionistic fuzzy rw-closed set in (i,v)-intuitionistic fuzzy topological space X.

Proof: Let $\bar{D}$ be an (i,v)-intuitionistic fuzzy closed set in an (i,v)-intuitionistic fuzzy topological space Y. Then $\bar{D}^C$ is (i,v)-intuitionistic fuzzy open in (i,v)-intuitionistic fuzzy topological space Y. Since f is (i,v)-intuitionistic fuzzy rw-continuous, f^{-1}($\bar{D}^C$) is (i,v)-intuitionistic fuzzy rw-open in (i,v)-intuitionistic fuzzy topological space X. But f^{-1}($\bar{D}^C$) =[f^{-1}($\bar{D}$)]^C and so f^{-1}($\bar{D}$) is an (i,v)-intuitionistic fuzzy rw-closed set in (i,v)-intuitionistic fuzzy topological space X.

Conversely, assume that the inverse image of every (i,v)-intuitionistic fuzzy closed set in Y is (i,v)-intuitionistic fuzzy rw-closed in (i,v)-intuitionistic fuzzy topological space X. Let $\bar{A}$ be an (i,v)-intuitionistic fuzzy open set in (i,v)-intuitionistic fuzzy topological space Y. Then $\bar{A}^C$ is (i,v)-intuitionistic fuzzy closed in Y. By hypothesis f^{-1}($\bar{A}^C$) = [f^{-1}($\bar{A}$)]^C is (i,v)-intuitionistic fuzzy rw-closed in X and so f^{-1}($\bar{A}$) is an (i,v)-intuitionistic fuzzy rw-open set in (i,v)-intuitionistic fuzzy topological space X. Thus f is (i,v)-intuitionistic fuzzy rw-continuous.

2.3 Theorem: If a function f : (X, $\Im$) ⟶ (Y, σ) is (i,v)-intuitionistic fuzzy almost continuous, then it is (i,v)-intuitionistic fuzzy rw-continuous.

Proof: Let a function f : (X, $\Im$) ⟶ (Y, σ) be an (i,v)-intuitionistic fuzzy almost continuous and $\bar{A}$ be an (i,v)-intuitionistic fuzzy open set in (i,v)-intuitionistic fuzzy topological space Y. Then f^{-1}($\bar{A}$) is an (i,v)-intuitionistic fuzzy regular open set in (i,v)-intuitionistic fuzzy topological space X. Now f^{-1}($\bar{A}$) is (i,v)-intuitionistic fuzzy rw-open in X, as every (i,v)-intuitionistic fuzzy regular open set is (i,v)-intuitionistic fuzzy rw-open. Therefore f is (i,v)-intuitionistic fuzzy rw-continluous.

2.3 Remark: The converse of the above theorem need not be true in general.

2.2 Example: Consider the (i,v)-intuitionistic fuzzy topological spaces (X, $\Im$) and (Y, σ) as defined in Example 3.2.1. Define a map f : (X, $\Im$) ⟶ ⟶ (Y, σ) by f(1) = 2, f(2) = 3 and f(3) = 1. Then f is (i,v)-intuitionistic fuzzy rw-continuous but it is not almost continuous.

2.4 Theorem: Show that (i,v)-intuitionistic fuzzy semi continuous maps and (i,v)-intuitionistic fuzzy rw-continuous maps are independent.

Proof: Consider the following examples. Let X=Y= {1, 2, 3} and the (i,v)-intuitionistic fuzzy sets $\bar{A}$ = ⟨x, $\bar{\mu}_A$, $\bar{\gamma}_A$⟩, $\bar{B}$ = ⟨x, $\bar{\mu}_B$, $\bar{\gamma}_B$⟩ are defined as $\bar{A}$ ={ <1, [1, 1], [0, 0]>, <2, [0, 0], [1, 1] >, <3, [0, 0], [1, 1]> }, $\bar{B}$ ={ <1, [0, 0], [1, 1] >, <2, [1, 1], [0, 0]>, <3, [1, 1], [0, 0] > }. Consider $\Im$ ={ $\bar{0}$, $\bar{1}$, $\bar{A}$ }, σ = { $\bar{0}$, $\bar{1}$, $\bar{B}$ }. Now (X, $\Im$) and (Y, σ) are the (i,v)-intuitionistic fuzzy topological spaces. Define a map f : (X, $\Im$) ⟶ (Y, σ) by f(1) = 1, f(2) = 2 and f(3) = 3. Then f is (i,v)-intuitionistic fuzzy rw-continuous but it is not (i,v)-intuitionistic fuzzy semi continuous, as the inverse image of (i,v)-intuitionistic fuzzy set B in (Y, σ) is $\bar{D}$ = ⟨x, $\bar{\mu}_D$, $\bar{\gamma}_D$⟩ defined as $\bar{D}$ ={ <1, [0, 0], [1, 1]>, <2, [1, 1], [0, 0]>, < 3, [1, 1], [0, 0]> }. This is not an (i,v)-intuitionistic fuzzy semiopen set in (i,v)-intuitionistic fuzzy topological space X. And, let X=Y= {1, 2, 3} and the (i,v)-intuitionistic fuzzy sets $\bar{A}$ = ⟨x, $\bar{\mu}_A$, $\bar{\gamma}_A$⟩, $\bar{B}$ = ⟨x, $\bar{\mu}_B$, $\bar{\gamma}_B$⟩, $\bar{C}$ = ⟨x, $\bar{\mu}_C$, $\bar{\gamma}_C$⟩, $\bar{D}$ = ⟨x, $\bar{\mu}_D$, $\bar{\gamma}_D$⟩ are defined as $\bar{A}$ ={ <1, [1, 1], [0, 0]>, <2, [0, 0], [1, 1]>, <3, [0, 0], [1, 1]>}, $\bar{B}$ ={ <1, [0, 0], [1, 1]>, <2, [1, 1], [0, 0]>, < 3, [0, 0], [1, 1] > }, $\bar{C}$ ={ <1, [1, 1], [0, 0] >, <2, [1, 1], [0, 0] >, <3, [0, 0], [1, 1]> }, $\bar{D}$ ={ <1, [0, 0], [1, 1]>, <2, [0, 0], [1, 1]>, <3, [1, 1], [0, 0]> }. Consider $\Im$ ={ $\bar{0}$, $\bar{1}$, $\bar{A}$, $\bar{B}$, $\bar{C}$ } and σ = { $\bar{0}$, $\bar{1}$, $\bar{D}$ }. Now (X, $\Im$) and (Y, σ) are the (i,v)-intuitionistic fuzzy topological spaces. Define a map f : (X, $\Im$) ⟶ (Y, σ) by f(1) = f(3) = 3 and f(2) = 2. Then f is (i,v)-intuitionistic fuzzy semi continuous but it is not (i,v)-intuitionistic fuzzy rw-continuous, as the inverse image of (i,v)-intuitionistic fuzzy set $\bar{D}$ in (Y, σ) is $\bar{E}$ = ⟨x, $\bar{\mu}_E$, $\bar{\gamma}_E$⟩ defined as $\bar{E}$ ={ <1, [1, 1], [0, 0] >, <2, [0, 0], [1, 1]>, < 3, [1, 1], [0, 0]> }. This is not an (i,v)-intuitionistic fuzzy rw-open set in (i,v)-intuitionistic fuzzy topological space X.

2.5 Theorem: Show that (i,v)-intuitionistic fuzzy generalized continuous maps and (i,v)-intuitionistic fuzzy rw-continuous maps are independent.

Proof: Consider the (i,v)-intuitionistic fuzzy topological spaces (X, $\Im$) and (Y, σ) as defined in example in Theorem 2.4. Define a map f : (X, $\Im$) ⟶ (Y, σ) by f(1) = 1, f(2) = 2 and f(3) = 3. Then f is (i,v)-intuitionistic fuzzy rw-continuous but it is not (i,v)-intuitionistic fuzzy g-continuous as the inverse image of (i,v)-intuitionistic fuzzy set $\bar{D}$ in (Y, σ) is $\bar{E}$ = ⟨x, $\bar{\mu}_E$, $\bar{\gamma}_E$⟩ defined as $\bar{E}$ ={ <1, [0, 0], [1, 1]>, <2, [0, 0], [1, 1]>, <3, [1, 1], [0, 0]> }. This is not an (i,v)-intuitionistic fuzzy g-open set in (i,v)-intuitionistic fuzzy topological space X. And, let X = {1, 2, 3, 4} and the (i,v)-intuitionistic fuzzy sets $\bar{A}$ = ⟨x, $\bar{\mu}_A$, $\bar{\gamma}_A$⟩, $\bar{B}$ = ⟨x, $\bar{\mu}_B$, $\bar{\gamma}_B$⟩, $\bar{C}$ = ⟨x, $\bar{\mu}_C$, $\bar{\gamma}_C$⟩ are defined as $\bar{A}$ = { <1, [1, 1], [0, 0]>, <2, [0, 0], [1, 1] >, <3, [0, 0], [1, 1]>, <4, [0, 0], [1, 1]> }, $\bar{B}$ = { <1, [0, 0], [1, 1] >, <2, [1, 1], [0, 0] >, <3, [0, 0], [1, 1]>, < 4, [0, 0], [1, 1]> }, $\bar{C}$ = { <1, [1, 1], [0, 0] >, <2, [1, 1], [0, 0] >, <3, [0, 0], [1, 1] >, <4, [0, 0], [1, 1]> }. Let Y = {1, 2, 3} and the (i,v)-intuitionistic fuzzy sets $\bar{D}$ = ⟨x, $\bar{\mu}_D$, $\bar{\gamma}_D$⟩ is defined as $\bar{D}$ ={ <1, [0, 0], [1, 1] >, < 2, [1, 1], [0, 0] >, <3, [1, 1], [0, 0] > }. Consider $\Im$={ $\bar{0}$, $\bar{1}$, $\bar{A}$, $\bar{B}$, $\bar{C}$} and σ={ $\bar{0}$, $\bar{1}$, $\bar{D}$}. Now (X, $\Im$) and (Y, σ) are the (i,v)-intuitionistic fuzzy topological spaces. Define a map f : (X, $\Im$) ⟶ (Y, σ) by f(1) = f(4) = 3, f(2) = 2 and f(3) = 3. Then f is (i,v)-intuitionistic fuzzy g-continuous but it is not (i,v)-intuitionistic fuzzy rw-continuous, as the inverse image of (i,v)-intuitionistic fuzzy set $\bar{D}$ in (Y, σ) is $\bar{E}$ = ⟨x, $\bar{\mu}_E$, $\bar{\gamma}_E$⟩ is defined as $\bar{E}$ ={ <1, [0, 0], [1, 1]>, <2, [1, 1], [0, 0] >, <3, [1, 1], [0, 0]> }. This is not an (i,v)-intuitionistic fuzzy rw-open set in (i,v)-intuitionistic fuzzy topological space X.

2.6 Theorem: If a function f : (X, $\Im$) ⟶ (Y, σ) is (i,v)-intuitionistic fuzzy rw-continuous and (i,v)-intuitionistic fuzzy completely semi continuous then it is (i,v)-intuitionistic fuzzy continuous.

Proof: Let a function f : (X, $\Im$) ⟶ (Y, σ) be an (i,v)-intuitionistic fuzzy rw-continuous and (i,v)-intuitionistic fuzzy completely semi continuous. Let $\bar{E}$ be an (i,v)-intuitionistic fuzzy closed set in (i,v)-intuitionistic fuzzy topological space Y. Then f^{-1}($\bar{E}$) is both (i,v)-intuitionistic fuzzy regular semiopen and (i,v)-intuitionistic fuzzy rw-closed set in (i,v)-intuitionistic fuzzy topological space X. By Theorem 1.1, f^{-1}($\bar{E}$) is an (i,v)-intuitionistic fuzzy closed set in (i,v)-intuitionistic fuzzy topological space X. Therefore f is an (i,v)-intuitionistic fuzzy continuous.

2.7 Theorem: If f : (X, $\Im$)⟶ (Y, σ) is (i,v)-intuitionistic fuzzy rw-continuous and g : (Y, σ)⟶ (Z, η) is (i,v)-intuitionistic fuzzy continuous, then their composition g•f : (X, $\Im$)⟶ (Z, η) is (i,v)-intuitionistic fuzzy rw-continuous.

Proof: Let $\bar{A}$ be an (i,v)-intuitionistic fuzzy open set in (i,v)-intuitionistic fuzzy topological space Z. Since g is (i,v)-intuitionistic fuzzy continuous, g^{-1}($\bar{A}$) is an (i,v)-intuitionistic fuzzy open set in (i,v)-intuitionistic fuzzy topological space Y. Since f is (i,v)-intuitionistic fuzzy rw-continuous, f^{-1}(g^{-1}($\bar{A}$)) is an (i,v)-intuitionistic fuzzy rw-open set in (i,v)-intuitionistic fuzzy topological space X. But (g•f)$^{-1}$($\bar{A}$) = f^{-1}(g^{-1}($\bar{A}$)). Thus g•f is (i,v)-intuitionistic fuzzy rw-continuous.

2.8 Theorem: If a map f : X ⟶ Y is (i,v)-intuitionistic fuzzy rw-irresolute, then it is (i,v)-intuitionistic fuzzy rw-continuous.

Proof: Let $\bar{A}$ be an (i,v)-intuitionistic fuzzy open set in Y. Since every (i,v)-intuitionistic fuzzy open set is (i,v)-intuitionistic fuzzy rw-open, $\bar{A}$ is an (i,v)-intuitionistic fuzzy rw-open set in Y. Since f is (i,v)-intuitionistic fuzzy rw-irresolute, $f^{-1}(\bar{A})$ is (i,v)-intuitionistic fuzzy rw-open in X. Thus f is (i,v)-intuitionistic fuzzy rw-continuous.

2.5 Remark: The converse of the above theorem need not be true in general.

2.3 Example: Let X = Y = { 1, 2, 3 } and the (i,v)-intuitionistic fuzzy sets $\bar{A}$ = áx, μ_A, γ_A〉, $\bar{B}$ = 〈x, μ_B, γ_B 〉, $\bar{C}$ = 〈x, μ_C, γ_C〉 are defined as $\bar{A}$ ={ <1, [1, 1], [0, 0] >, <2, [0, 0], [1, 1] >, < 3, [0, 0], [1, 1] > }, $\bar{B}$ ={ <1, [0, 0], [1, 1] >, <2, [1, 1], [0, 0] >, <3, [0, 0], [1, 1] > }, $\bar{C}$ ={ <1, [1, 1], [0, 0] >, <2, [1, 1], [0, 0] >, < 3, [0, 0], [1, 1] > }. Consider $\Im_1$ = { $\bar{0}$, $\bar{1}$, $\bar{A}$, $\bar{B}$, $\bar{C}$ } and $\Im_2$ = { $\bar{0}$, $\bar{1}$, $\bar{A}$ }. Now (X, $\Im_1$) and (Y, $\Im_2$) are (i,v)-intuitionistic fuzzy topological spaces. Define a map f : (X, $\Im_1$) ⟶ (Y, $\Im_2$) be the identity map. Then f is (i,v)-intuitionistic fuzzy rw-continuous but it is not (i,v)-intuitionistic fuzzy rw-irresolute. Since for the (i,v)-intuitionistic fuzzy rw-open set $\bar{E}$ = 〈x, μ_E, γ_E〉 is defined as $\bar{E}$ ={ <1, [0, 0], [1, 1]>, <2, [1, 1], [0, 0]>, <3, [1, 1], [0, 0]> } in Y, $f^{-1}(\bar{E})$ = $\bar{E}$ is not (i,v)-intuitionistic fuzzy rw-open in (X, $\Im_1$).

2.9 Theorem: Let X, Y and Z be (i,v)-intuitionistic fuzzy topological spaces. If f : X ⟶Y is (i,v)-intuitionistic fuzzy rw-irresolute and g : Y ⟶ Z is (i,v)-intuitionistic fuzzy rw-continuous then their composition g•f : X⟶ Z is (i,v)-intuitionistic fuzzy rw-continuous.

Proof: Let $\bar{A}$ be any (i,v)-intuitionistic fuzzy open set in (i,v)-intuitionistic fuzzy topological space Z. Since g is (i,v)-intuitionistic fuzzy rw-continuous, $g^{-1}(\bar{A})$ is an (i,v)-intuitionistic fuzzy rw-open set in (i,v)-intuitionistic fuzzy topological space Y. Since f is (i,v)-intuitionistic fuzzy rw-irresolute $f^{-1}(g^{-1}(\bar{A}))$ is an (i,v)-intuitionistic fuzzy rw-open set in (i,v)-intuitionistic fuzzy topological space X. But $(g \bullet f)^{-1}(\bar{A}) = f^{-1}(g^{-1}(\bar{A}))$. Thus g•f is (i,v)-intuitionistic fuzzy rw-continuous.

2.10 Theorem: Let X, Y and Z be (i,v)-intuitionistic fuzzy topological spaces and f : X ⟶ Y and g : Y⟶ Z be (i,v)-intuitionistic fuzzy rw-irresolute maps, then their composition g•f : X ⟶ Z is (i,v)-intuitionistic fuzzy rw-irresolute map.

Proof: Let`A be any (i,v)-intuitionistic fuzzy rw-open set in (i,v)-intuitionistic fuzzy topological space Z. Since g is (i,v)-intuitionistic fuzzy rw-irresolute, g-1(`A) is an (i,v)-intuitionistic fuzzy rw-open set in (i,v)-intuitionistic fuzzy topological space Y. Since f is (i,v)-intuitionistic fuzzy rw-irresolute f-1(g-1(`A ) ) is an (i,v)-intuitionistic fuzzy rw-open set in (i,v)-intuitionistic fuzzy topological space X. But ( g·f )-1(`A) = f-1(g-1(`A)). Thus g·f is (i,v)-intuitionistic fuzzy rw-continuous.

2.11 Theorem: Let $\bar{A}$ be an (i,v)-intuitionistic fuzzy w-closed set in an (i,v)-intuitionistic fuzzy topological space (X, $\Im$) and f : (X, $\Im$) → (Y, σ) is an (i,v)-intuitionistic fuzzy almost irresolute and (i,v)-intuitionistic fuzzy closed mapping then f ($\bar{A}$) is an (i,v)-intuitionistic fuzzy rw-closed set in Y.

Proof: Let $\bar{A}$ be an (i,v)-intuitionistic fuzzy w-closed set in X and f : (X, $\Im$) → (Y, σ) is an (i,v)-intuitionistic fuzzy almost irresolute and (i,v)-intuitionistic fuzzy closed mapping. Let f($\bar{A}$) ⊆ $\bar{O}$ where $\bar{O}$ is (i,v)-intuitionistic fuzzy regular semi open in Y then $\bar{A} \subseteq f^{-1}(\bar{O})$ and $f^{-1}(\bar{O})$ is (i,v)-intutionistic fuzzy semi open in X because f is (i,v)-intuitionistic fuzzy almost irresolute. Now $\bar{A}$ be an (i,v)-intuitionistic fuzzy w-closed set in X, cl($\bar{A}$) ⊆ $f^{-1}(\bar{O})$. Thus, f(cl($\bar{A}$)) ⊆ $\bar{O}$ and f(cl($\bar{A}$)) is an (i,v)-intuitionistic fuzzy closed set in Y (since cl($\bar{A}$) is (i,v)-intuitionistic fuzzy closed in X and f is (i,v)-intuitionistic fuzzy closed mapping). It follows that cl(f ($\bar{A}$)) ⊆ cl(f (cl($\bar{A}$))) = f (cl($\bar{A}$)) ⊆ $\bar{O}$. Hence cl(f ($\bar{A}$)) ⊆ $\bar{O}$ whenever f($\bar{A}$) ⊆ $\bar{O}$ and $\bar{O}$ is (i,v)-intuitionistic fuzzy regular semi open in Y. Hence f ($\bar{A}$) is (i,v)-intuitionistic fuzzy rw-closed set in Y.

2.12 Theorem: Let (X, $\Im$) be an (i,v)-intuitionistic fuzzy topological space and IVIFRSO(X) (resp. IVIFC(X)) be the family of all (i,v)-intuitionistic fuzzy regular semi open (resp. (i,v)-intuitionistic fuzzy closed) sets of X. Then IVIFRSO(X) ⊆ IVIFC(X) if and only if every (i,v)-intuitionistic fuzzy set of X is (i,v)-intuitionistic fuzzy rw-closed.

Proof: Suppose that IVIFRSO(X) ⊆ IVIFC(X) and let $\bar{A}$ be any (i,v)-intuitionistic fuzzy set of X such that $\bar{A} \subseteq \bar{U}$ ∈IVIFRSO(X). i.e. $\bar{U}$ is (i,v)-intuitionistic fuzzy regular semi open. Then, cl($\bar{A}$) ⊆ cl($\bar{U}$) = $\bar{U}$ because $\bar{U}$∈IVIFRSO(X) ∈ IVIFC(X). Hence cl($\bar{A}$) ⊆ $\bar{U}$ whenever $\bar{A} \subseteq \bar{U}$ and $\bar{U}$ is (i,v)-intuitionistic fuzzy regular semi open. Hence $\bar{A}$ is (i,v)-intuitionistic fuzzy rw-closed set.

Suppose that every (i,v)-intuitionistic fuzzy set of X is (i,v)-intuitionistic fuzzy rw-closed. Let $\bar{U}$∈IVIFRSO(X), then since $\bar{U} \subseteq \bar{U}$ and $\bar{U}$ is (i,v)-intuitionistic fuzzy rw-closed, cl($\bar{U}$) ⊆ $\bar{U}$, then $\bar{U}$∈IVIFC(X). Thus IVIFRSO(X) ⊆ IVIFC(X).

2.6 Remark: Every (i,v)-intuitionistic fuzzy w-continuous mapping is (i,v)-intuitionistic fuzzy rw-continuous, but converse may not be true.

Proof: Consider the example, let X = { a, b }, Y = { x, y } and (i,v)-intuitionistic fuzzy sets $\bar{U}$ and $\bar{V}$ are defined as follows: $\bar{U}$ = { < a, [0.7, 0.7], [0.2, 0.2] >, < b, [0.6, 0.6], [0.3, 0.3] > }, $\bar{V}$ ={ < x, [0.7, 0.7], [0.2, 0.2] >, < y, [0.8, 0.8], [0.1, 0.1] > }. Let $\Im$ = { $\bar{1}$, $\bar{0}$, $\bar{U}$ } and σ = { $\bar{1}$, $\bar{0}$, $\bar{V}$ } be (i,v)-intuitionistic fuzzy topologies on X and Y respectively. Then the mapping *f* : (X, $\Im$)→ (Y, σ) defined by *f* (a) = x and *f* (b) = y is (i,v)-intuitionistic fuzzy rw-continuous but not (i,v)-intuitionistic fuzzy continuous.

2.7 Remark: Every (i,v)-intuitionistic fuzzy rw-continuous mapping is (i,v)-intuitionistic fuzzy rg-continuous, but converse may not be true.

Proof: Consider the example, let X = { a, b, c, d }, Y = { p, q r, s } and (i,v)-intuitionistic fuzzy sets $\bar{O}$, $\bar{U}$, $\bar{V}$, $\bar{W}$, $\bar{T}$ are defined as follows: $\bar{O}$ ={<a, [0.9, 0.9], [0.1, 0.1] >, < b, [0, 0], [1, 1] >, <c, [0, 0], [1, 1]>, <d, [0, 0], [1, 1] > }, $\bar{U}$ = { < a, [0, 0], [1, 1] >, < b, [0.8, 0.8], [0.1, 0.1] >, <c, [0, 0], [1, 1]>, <d, [0, 0], [1, 1]> }, $\bar{V}$ = { <a, [0.9, 0.9], [0.1, 0.1]>, <b, [0.8, 0.8], [0.1, 0.1] >, <c, [0, 0], [1, 1] >, < d, [0, 0], [1, 1]> }, $\bar{W}$ = {<a, [0.9, 0.9], [0.1, 0.1] >, < b, [0.8, 0.8], [0.1, 0.1] >, < c, [0.7, 0.7], [0.2, 0.2] >, <d, [0, 0], [1, 1]> }, $\bar{T}$ = {<p, [0, 0], [1, 1]>, <q, [0, 0], [1, 1]>, < r, [0.7, 0.7], [0.2, 0.2]>, <s, [0, 0], [1, 1]> }. Let $\Im$ ={ $\bar{1}$, $\bar{0}$, $\bar{O}$, $\bar{U}$, $\bar{V}$, $\bar{W}$} and σ ={ $\bar{1}$, $\bar{0}$, $\bar{T}$} be (i,v)-intuitionistic fuzzy topologies on X and Y respectively. Then the mapping *f* : (X, $\Im$) → (Y, σ) defined by *f* (a) = p, *f* (b) = q, *f* (c) = r, *f* (d) = s is (i,v)-intuitionistic fuzzy rg-continuous but not (i,v)-intuitionistic fuzzy rw-continuous.

2.8 Remark: Every (i,v)-intuitionistic fuzzy rw-continuous mapping is (i,v)-intuitionistic fuzzy gpr-continuous, but converse may not be true.

Proof: Consider the example, let X = {a, b, c, d, e} Y = {p, q, r, s, t} and (i,v)-intuitionistic fuzzy sets $\bar{O}$, $\bar{U}$, $\bar{V}$, $\bar{W}$ are defined as follows: $\bar{O}$ = { < a, [0.9, 0.9], [0.1, 0.1]>, <b, [0.8, 0.8], [0.1, 0.1]>, <c, [0, 0], [1, 1]>, <d, [0, 0], [1, 1]>, <e, [0, 0], [1, 1]> }, $\bar{U}$ = { <a, [0, 0], [1, 1]> ,<b, [0, 0], [1, 1]>, <c, [0.8, 0.8], [0.1, 0.1]>, <d, [0.7, 0.7], [0.2, 0.2]>, <e, [0, 0], [1, 1] >}, $\bar{V}$ = { <a, [0.9, 0.9], [0.1, 0.1] >, <b, [0.8, 0.8], [0.1, 0.1]>, <c, [0.8, 0.8], [0.1, 0.1]>, <d, [0.7, 0.7], [0.2, 0.2]>, <e, [0, 0], [1, 1] > }, $\bar{W}$ = { <a, [0.9, 0.9], [0.1, 0.1] >, < b, [0, 0], [1, 1] >, < c, [0.8, 0.8], [0.1, 0.1] >, < d, [0.7, 0.7], [0.2, 0.2] >, < e, [0, 0], [1, 1] > }. Let $\Im$ ={ $\bar{1}$, $\bar{0}$, $\bar{O}$, $\bar{U}$, $\bar{V}$} and σ = { $\bar{1}$, $\bar{0}$, $\bar{W}$ } be (i,v)-intuitionistic fuzzy topologies on X and Y respectively. Then the mapping *f : (X, $\Im$) → (Y, σ)* defined by *f* (a) = p, *f* (b) = q, *f* (c) = r, *f* (d) = s, *f* (e) = t is (i,v)-intuitionistic fuzzy gpr-continuous but not (i,v)-intuitionistic fuzzy rw-continuous.

2.13 Theorem: If *f* : (X, $\Im$) → (Y, σ) is (i,v)-intuitionistic fuzzy rw-continuous, then *f(ivifrwcl($\bar{A}$)*⊆ cl(f($\bar{A}$)) for every (i,v)-intuitionistic fuzzy set $\bar{A}$ of X.

Proof: Let $\bar{A}$ be an (i,v)-intuitionistic fuzzy set of X. Then cl(f($\bar{A}$)) is an (i,v)-intuitionistic fuzzy closed set of Y. Since *f* is (i,v)-intuitionistic fuzzy rw-continuous, f^{-1}(cl(f($\bar{A}$))) is (i,v)-intuitionistic fuzzy rw-closed in X. Clearly $\bar{A} \subseteq f^{-1}$(cl(($\bar{A}$)). Therefore ivifwcl($\bar{A}$) $\subseteq$ ivifwcl(f^{-1}(cl(f($\bar{A}$)))) = f^{-1}(cl(f($\bar{A}$))). Hence *f* (ivifrwcl($\bar{A}$)) $\subseteq$ cl(f ($\bar{A}$)) for every (i,v)-intuitionistic fuzzy set $\bar{A}$ of X.

2.14 Theorem: If *f* : (X, $\Im$) $\rightarrow$ (Y, σ) is (i,v)-intuitionistic fuzzy rg-irresolute and *g* : (Y, σ) $\rightarrow$ (Z, λ) is (i,v)-intuitionistic fuzzy rw-continuous. Then *gof* : (X, $\Im$) $\rightarrow$ (Z, λ) is (i,v)-intuitionistic fuzzy rg-continuous.

Proof: Let $\bar{A}$ is an (i,v)-intuitionistic fuzzy closed set in Z, then g^{-1}($\bar{A}$) is (i,v)-intuitionistic fuzzy rw-closed in Y, because *g* is (i,v)-intuitionistic fuzzy rw-continuous. Since every (i,v)-intuitionistic fuzzy rw-closed set is (i,v)-intuitionistic fuzzy rg-closed set, therefore g^{-1}($\bar{A}$) is (i,v)-intuitionistic fuzzy rg-closed in Y .Then $(gof)^{-1}$($\bar{A}$) = $f^{-1}(g^{-1}$($\bar{A}$)) is (i,v)-intuitionistic fuzzy rg-closed in X, because *f* is (i,v)-intuitionistic fuzzy rg-irresolute. Hence *gof* : (X, $\Im$) $\rightarrow$ (Z, λ) is (i,v)-intuitionistic fuzzy rg-continuous.

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