Decomposition of rg*b-Closed Sets in Supra Topological Spaces

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Abstract — In this paper, we introduce a new class of sets called supra *rg**b*-locally closed sets and a new class of maps called supra rg*b-locally continuous functions. Furthermore, we obtain some of their properties.

Keywords— *S-rg*b-LC sets, S-rg*b-LC* sets, S-rg*b-LC** sets, S-rg*b-L-continuous and S-rg*b-L-irresolute.*

I. INTRODUCTION

Sindhu et al [8] defined and studied rg*b-closed sets in Topological spaces. Bourbaki [1] defined a subset of space (X, τ) is called locally closed, if it is the intersection of an open set and a closed set. In topological space, some classes of sets namely generalized locally closed sets were introduced and investigated by Balachandran et al. [2]. Mashhour et al. [6] introduced the supra topological spaces and studied S-continuous functions and S*-continuous functions. Indirani et al. [3] introduced and studied a class of sets and maps called supra rg*b-closed sets and supra rg*b -continuous maps.

In this paper we introduce the concept of supra rg*b -locally closed sets and study its basic properties. Also we introduce the concepts of supra rg*b -locally continuous maps and investigate some of its properties.

II. PRELIMINARIES

Throughout this paper, (X, τ), (Y, σ) and (Z, η) (or simply, X, Y and Z) represent topological space on which no separation axioms are assumed, unless explicitly stated. For a subset A of (X, τ), cl (A) and int (A) represent the closure of A with respect to τ and the interior of A with respect to τ, respectively. Let P(X) be the power set of X. The complement of A is denoted by X-A or A^c .

Now we recall some Definitions and results which are useful in the sequel.

Definition: 2.1 [6,7]

Let X be a non-empty set. The subfamily μ ⊆ P(X) is said to be a supra topology on X if X∈ μ and μ is closed under arbitrary union. The pair (X, μ) is called a supra topological space.

The elements of μ are said to be supra open in (X, μ). Complement of supra open sets are called supra closed sets.

Definition: 2.2 [7]

Let A be a subset of (X, μ). Then

(i) The supra closure of a set A is, denoted by $cl^{\mu}(A)$, defined as $cl^{\mu}(A) = \cap$ {B : B is a supra closed and A ⊆ B}.

(ii)The supra interior of a set A is, denoted by $int^{\mu}(A)$, defined as $int^{\mu}(A) = \cup$ {B : B is a supra open and B ⊆ A}.

Definition: 2.3 [6]

Let (X, τ) be a topological space and μ be a supra topology of X. We call μ is a supra topology associated with τ if τ ⊆μ.

Definition: 2.4 [4]

Let (X, τ) and (Y, σ) be two topological spaces and τ ⊆ μ. A function f: (X, τ) → (Y,σ) is called supra continuous, if the inverse image of each open set of Y is a supra open set in X.

Definition: 2.5 [5]

Let (X, τ) and (Y, σ) be two topological spaces and μ and λ be supra topologies associated with τ and σ respectively. A function f : (X, τ) → (Y,σ) is said to be supra irresolute , if f^{-1} (A) is supra open set of X for every supra open set A in Y.

Definition: 2.6 [3]

A subset A of a supra topological space (X, μ), is called Supra Regular Generalized star b- closed set (briefly rg^*b^{μ}-closed set) if $bcl^{\mu}(A) \subseteq U$ whenever A ⊆U and U is rg^{μ}-open in X.

The family of all rg*b-closed subsets of X is denoted by RG^*B^{μ}-C(X).

Definition: 2.7[3]

Let A be a subset (X, μ). Then

(i) The supra rg*b-closure of a set A is, denoted by $rg^*b^{\mu}-cl(A)$, defined as $rg^*b^{\mu}-cl(A) = \cap$ {B : B is supra rg*b-closed and A ⊆ B}

(ii) The supra rg*b-interior of a set A is, denoted by $rg^*b^{\mu}-int(A)$, defined as $rg^*b^{\mu}-int(A) = \cup$ {B : B is supra rg*b-open and B ⊆ A}

III. SUPRA rg*b-LOCALLY CLOSED SETS

In this section, we introduce the notion of supra rg*b-locally closed sets and discuss some of their properties.

Definition: 3.1

Let (X, μ) be a supra topological space. A subset A of (X, μ) is called supra rg*b -locally closed set (briefly supra rg*b -LC set), if A=U ∩ V, where U is supra rg*b -open in (X, μ) and V is supra rg*b -closed in (X, μ).

The collection of all supra rg*b-locally closed sets of X will be denoted by S- rg*b -LC(X).

Remark: 3.2

Every supra rg*b -closed set (resp. supra rg*b -open set) is S-rg*b -LC.

Definition: 3.3

For a subset A of a supra topological space (X, μ), A ∈ S-rg*b -LC*(X, μ), if there exist a supra rg*b -open set U and a supra closed set V of (X, μ), respectively such that A=U ∩ V.

Definition: 3.4

For a subset A of (X, μ), A ∈ S- rg*b -LC**(X, μ), if there exist a supra open set U and a supra rg*b -closed set V of (X, μ), respectively such that A=U ∩ V.

Definition: 3.5

Let (X, μ) be a supra topological space. If the space (X, μ) is called a supra RG*B-space, then the collection of all supra rg*b-open subsets of (X, μ) is closed under finite intersection.

Definition: 3.6

Let A, B ⊆ (X, μ). Then A and B are said to be supra β-separated if A ∩ $rg^*b^\mu - cl$(B) = B ∩ $rg^*b^\mu - cl$(A) = ϕ.

Theorem: 3.7

Let A be a subset of (X, μ). If A ∈ S- rg*b -LC*(X, μ) or A ∈ S- rg*b -LC**(X, μ), then A is S- rg*b -LC.

Proof:

The proof is obvious by Definitions and the following example.

Example: 3.8

Let X = {a, b, c} and μ = {ϕ, X, {a, b}, {a, c}}. Then {b,c}∈ S- rg*b –LC but not S- rg*b –LC* and S- rg*b –LC**

Theorem: 3.9

For a subset A of (X, μ), the following are equivalent:

(i) A ∈ S- rg*b -LC*(X, μ).
(ii) A = U ∩ $cl^\mu(A)$, for some supra rg*b-open set U.
(iii) $cl^\mu(A)$ – A is supra rg*b-closed.
(iv) A∪ [X- $cl^\mu(A)$] is supra rg*b-open.

Proof:

(i) ⇒ (ii): Given A ∈ S-rg*b-LC*(X, μ).Then there exist a supra rg*b-open subset U and a supra closed subset V such that A=U ∩V. Since A ⊂ U and A ⊂ $cl^\mu(A)$, A ⊂ U ∩ $cl^\mu(A)$. Conversely, $cl^\mu(A)$ ⊂ V and hence A = U ∩ V ⊃ U ∩ $cl^\mu(A)$. Therefore, A = U ∩ $cl^\mu(A)$.

(ii) ⇒ (i): Let A = U∩ $cl^\mu(A)$, for some supra rg*b-open set U. Then, $cl^\mu(A)$ is supra closed and hence A = U ∩ $cl^\mu(A)$ ∈ S-rg*b-LC*(X, μ).

(ii) ⇒(iii): Let A = U ∩ $cl^\mu(A)$, for some supra rg*b-open set U. Then A ∈ S-rg*b -LC*(X, μ). This implies U is supra rg*b-open and $cl^\mu(A)$ is supra closed. Therefore, $cl^\mu(A)$ − A is supra rg*b-closed.

(iii) ⇒ (ii): Let U = X – [$cl^\mu(A)$ - A]. By (iii), U is supra rg*b-open in X. Then A = U ∩ $cl^\mu(A)$ holds.

(iii) ⇒ (iv): Let Q = $cl^\mu(A)$ –A be supra rg*b-closed. Then X-Q = X - [$cl^\mu(A)$ – A] =A ∪ [(X- $cl^\mu(A)$]. Since X-Q is supra rg*b-open, A ∪ [X- $cl^\mu(A)$] is supra rg*b-open.

(iv) ⇒ (iii): Let U = A ∪ [(X- $cl^\mu(A)$]. Since X – U is supra rg*b-closed and X - U = $cl^\mu(A)$ - A is supra rg*b-closed.

Theorem: 3.10:

For a subset A of (X, μ), the following are equivalent:

(i) A ∈ S- rg*b -LC(X, μ).
(ii) A = U ∩ $rg^*b^\mu - cl$(A), for some supra rg*b-open set U.
(iii) $rg^*b^\mu - cl$(A) – A is supra rg*b-closed.
(iv) A∪ [X - $rg^*b^\mu - cl$(A)] is supra rg*b-open.
(v) A ⊆ $rg^*b^\mu - int$(A∪[X- $rg^*b^\mu - cl$(A)])

Proof:

(i) ⇒ (ii): Given A ∈ S-rg*b-LC(X, μ). Then there exist a supra rg*b-open subset U and a supra rg*b-closed subset V such that A=U ∩V. Since A ⊂ U and A ⊂ $rg^*b^\mu - cl$(A), A ⊂ U ∩ $rg^*b^\mu - cl$(A). Conversely, $rg^*b^\mu - cl$(A) ⊂ V and hence A = U ∩ V ⊃ U ∩ $rg^*b^\mu - cl$(A). Therefore, A = U ∩ $rg^*b^\mu - cl$(A).

(ii) ⇒ (i): Let A = U∩ $rg^*b^\mu - cl$(A), for some supra rg*b-open set U. Then, $rg^*b^\mu - cl$(A) is supra rg*b-closed and hence A = U ∩ $rg^*b^\mu - cl$(A) ∈ S-rg*b-LC(X, μ).

(ii) ⇒(iii): Let A = U ∩ $rg^*b^\mu - cl$(A), for some supra rg*b-open set U. Then A ∈ S-rg*b -LC(X, μ). This implies U is supra rg*b-open and $rg^*b^\mu - cl$(A) is supra rg*b-closed. Therefore, $rg^*b^\mu - cl$(A) − A is supra rg*b-closed.

(iii) ⇒ (ii): Let U = X – [$rg^*b^\mu - cl$(A) - A]. By (iii), U is supra rg*b-open in X. Then A = U ∩ $rg^*b^\mu - cl$(A) holds.

(iii) ⇒ (iv): Let Q = $rg^*b^\mu - cl$(A) –A be supra rg*b-closed. Then X-Q = X - [$rg^*b^\mu - cl$(A) – A] =A ∪ [(X- $rg^*b^\mu - cl$(A)]. Since X-Q is supra rg*b-open, A ∪ [X- $rg^*b^\mu - cl$(A)] is supra rg*b-open.

(iv) ⇒ (iii): Let U = A ∪ [(X- $rg^*b^\mu - cl$(A)]. Since X – U is supra rg*b-closed and X - U = $rg^*b^\mu - cl$(A) - A is supra rg*b-closed.

(iv) ⇒ (v): Since A∪ [X - $rg^*b^\mu - cl$(A)] is supra rg*b-open, A ⊆ $rg^*b^\mu - int$(A∪[X- $rg^*b^\mu - cl$(A)])

(v)⇒(iv): Obvious.

Theorem: 3.12:

Let (X, μ) be a supra RG*B-space and A ⊂ X be S- rg*b –LC. Then

(i) $rg^*b^\mu - int$(A) ∈ S- rg*b -LC(X,μ).
(ii) $rg^*b^\mu - cl$(A) is contained in a supra rg*b- closed set
(iii) A is supra rg*b-open if $rg^*b^\mu - cl$(A) is supra rg*b-open.

Proof:

(i) Let A = U ∩ $rg^*b^\mu - cl$(A), for some supra rg*b-open set U. Now, $rg^*b^\mu - int$(A) = $rg^*b^\mu - int$(U ∩ $rg^*b^\mu - cl$(A)) = $rg^*b^\mu - int$(U)∩ $rg^*b^\mu - int$($rg^*b^\mu - cl$(A)) = $rg^*b^\mu - int$(U) ∩ $rg^*b^\mu - cl$($rg^*b^\mu - int$(A)) . Thus $rg^*b^\mu - int$(A) is S- rg*b -LC(X,μ).

(ii) $rg^*b^\mu - cl$(A) = $rg^*b^\mu - cl$(U ∩ $rg^*b^\mu - cl$(A)) ⊂ $rg^*b^\mu - cl$(U) ∩ $rg^*b^\mu - cl$(A) which is a rg*b-closed set.

(iii) $rg^*b^\mu - int$(A) = $rg^*b^\mu - int$ (U ∩ $rg^*b^\mu - cl$(A)) = $rg^*b^\mu - int$(U) ∩ $rg^*b^\mu - int$($rg^*b^\mu - cl$(A)) = U ∩ $rg^*b^\mu - cl$(A) =A, since $rg^*b^\mu - cl$(A) is supra rg*b- open. Hence A is supra rg*b-open.

Theorem: 3.12:

If A ⊂ B ⊂ X and B is S-rg*b-LC, then there exists a S-rg*b-LC set C such that A ⊂ C ⊂ B.

Proof:

Immediate.

Theorem: 3.13:

For a subset A of (X, μ), if A ∈ S-rg*b-LC**(X, μ), then there exist a supra open set G such that A = G ∩ $cl^{\mu}(A)$

Proof:

Let A ∈ S-rg*b-LC**(X, μ). Then A=G ∩ V, where G is a supra open set and V is a supra rg*b-closed set. Then A =G ∩ V ⇒ A ⊂ G. Obviously, A ⊂ $cl^{\mu}(A)$. Hence A ⊂ G ∩ $cl^{\mu}(A)$ ---(1). Also we have $cl^{\mu}(A)$ ⊂ V. This implies A = G ∩ V ⊃ G ∩ $cl^{\mu}(A)$ ⇒ A ⊃ G ∩ $cl^{\mu}(A)$ -----(2). From (1) and (2), we get A = G ∩ $cl^{\mu}(A)$.

Theorem: 3.14:

For a subset A of (X, μ), if A ∈ S-rg*b-LC**(X, μ), then there exist a supra open set G such that A = G ∩ $rg{*}b^{\mu} - cl$(A).

Proof:

Let A ∈ S-rg*b-LC**(X, μ). Then A=G ∩ V, where G is a supra open set and V is a supra rg*b-closed set. Then A =G ∩ V ⇒ A ⊂ G. Obviously, A ⊂ $rg{*}b^{\mu} - cl$(A). Hence A ⊂ G ∩ $rg{*}b^{\mu} - cl$(A) ----- (1) Also we have $rg{*}b^{\mu} - cl$(A) ⊂ V. This implies A = G ∩ V ⊃ G ∩ $rg{*}b^{\mu} - cl$(A) ⇒ A ⊃ G ∩ $rg{*}b^{\mu} - cl$(A) ----- (2) From (1) and (2), we get A = G ∩ $rg{*}b^{\mu} - cl$(A).

Theorem: 3.15:

Let A be a subset of (X, μ). If A ∈S-rg*b-LC**(X, μ), then $rg{*}b^{\mu} - cl$(A) - A is supra rg*b-closed and A ∪ [(X- $rg{*}b^{\mu} - cl$(A)] is supra rg*b-open.

Proof:

The proof is obvious from the Definitions and results.

Theorem: 3.16

Suppose (X, μ) is a supra RG*B-space. Let A ∈ S-rg*b-LC*(X, μ) and B ∈ S-rg*b-LC*(X, μ). If A and B are supra rg*b- separated, then A ∪ B ∈ S-rg*b- LC(X, μ).

Proof:

Let A∈ S-rg*b-LC(X, μ) and B ∈ S-rg*b-LC(X, μ). By Theorem: 3.9, there exist supra rg*b-open sets P and S of (X, μ) such that A = P ∩ $cl^{\mu}(A)$ and B = S ∩ $cl^{\mu}(B)$. Put L = P ∩ [X - $cl^{\mu}(B)$] and M = S ∩ [X - $cl^{\mu}(A)$]. Then L ∩ $rg{*}b^{\mu} - cl$(A)] = [P ∩ (X- $rg{*}b^{\mu} - cl$(B)] ∩ $rg{*}b^{\mu} - cl$(A)] = P ∩ $(rg{*}b^{\mu} - cl(B))^{c}$ ∩ $rg{*}b^{\mu} - cl$(A) = A ∩ $(rg{*}b^{\mu} - cl(B))^{c}$ = A, since A ⊂ $(rg{*}b^{\mu} - cl(B))c$. Similarly, M ∩ $rg{*}b^{\mu} - cl$(B) = B. Then L ∩ $rg{*}b^{\mu} - cl$(B)] = ϕ and M ∩ $rg{*}b^{\mu} - cl$(A) = ϕ. Since X is a supra RG*B-space, L and M are supra rg*b-open. (L ∪ M)∩ L ∩ $rg{*}b^{\mu} - cl$(A∪B) = (L ∪ M) ∩ ($rg{*}b^{\mu} - cl$(A) ∪ $rg{*}b^{\mu} - cl$(B)]) = (L ∩ $rg{*}b^{\mu} - cl$(A)]) ∪ (L ∩ $rg{*}b^{\mu} - cl$(B)) ∪ (M ∩ $rg{*}b^{\mu} - cl$(A)) ∪ (M ∩ $rg{*}b^{\mu} - cl$(B)]) = A ∪ B. Therefore A ∪ B ∈S-rg*b-LC(X, μ).

Definition: 3.17

Let (X, μ) be a supra topological space. A subset A of (X, μ) is called supra rg*b-dense, if $rg{*}b^{\mu} - cl$(A) = X.

Definition: 3.18

A supra topological space (X, μ) is called supra rg*b-submaximal, if every supra rg*b-dense subset is supra rg*b-open in X.

Theorem: 3.19

A supra topological space (X, μ) is supra rg*b-submaximal if and only if P(X) = S-rg*b-LC(X) holds.

Proof:

Necessity: Let A∈P(X) and G = A ∪[X- $rg{*}b^{\mu} - cl$(A)]. Then $rg{*}b^{\mu} - cl$(G) = X and so G is supra rg*b-dense and hence supra rg*b-open by assumption. By Theorem: 3.10, A∈S-rg*b-LC(X). Hence P(X) = S-rg*b-LC(X).

Sufficiency: Let every subset of X be supra rg*b-locally closed. Let A be supra rg*b-dense in X. Then $rg{*}b^{\mu} - cl$(A) = X. Now A = A∪[X- $rg{*}b^{\mu} - cl$(A)]. By Theorem: 3.10, A is supra rg*b-open. Hence X is supra rg*b-submaximal

Theorem: 3.20

Let (X, μ) and (Y, λ) be the supra topological spaces.

(1) If M ∈ S- rg*b -LC(X, μ) and N ∈ S- rg*b -LC(Y, λ), then M × N∈S- rg*b –LC (X × Y, μ × λ).

(2) If M ∈ S- rg*b -LC*(X, μ) and N ∈ S- rg*b -LC*(Y, λ), then M × N∈S- rg*b -LC*(X × Y, μ × λ).

(3) If M ∈ S- rg*b-LC**(X, μ) and N ∈ S- rg*b-LC**(Y, λ), then M × N ∈ S- rg*b -LC**(X ×Y, μ × λ).

Proof:

Let M ∈ S- rg*b -LC(X, μ) and N ∈ S- rg*b -LC(Y, λ). Then there exist a supra rg*b - open sets P and P’ of (X, μ) and (Y,λ) and supra rg*b -closed sets Q and Q’ of (X, μ) and (Y, λ) respectively such that M = P ∩ Q and N = P’ ∩ Q’. Then M ×N = (P × P’) ∩ (Q ×Q’) holds. Hence M × N∈S- rg*b -LC(X × Y, μ × λ). Similarly, the proofs of (2) and (3) follow from the Definitions.

IV. SUPRA rg*b LOCALLY CONTINUOUS FUNCTIONS

In this section we define a new type of functions called Supra rg*b -locally continuous functions (S- rg*b -L-continuous functions), supra rg*b -locally irresolute functions and study some of their properties.

Definition: 4.1

Let (X, τ) and (Y, σ) be two topological spaces and τ ⊆ μ. A function f : (X, τ) → (Y,σ**)** is called S- rg*b -L-continuous (resp., S- rg*b -L* - continuous, resp., S- rg*b -L** - continuous), if f^{-1}(A) ∈ S- rg*b -LC (X,μ), (resp., f^{-1} (A) ∈ S- rg*b -LC* (X,μ), resp., f^{-1} (A)∈ S- rg*b -LC** (X,μ)) for each A ∈σ.

Definition: 4.2

Let (X, τ) and (Y, σ) be two topological spaces and μ and λ be supra topologies associated with τ and σ respectively. A function f : (X, τ) → (Y,σ**)** is said to be S- rg*b -L-irresolute (resp., S- rg*b -L*- irresolute, resp., S- rg*b -L**-irresolute) if f^{-1} (A) ∈ S- rg*b -LC (X,μ), (resp., f^{-1} (A) ∈ S- rg*b -LC* (X,μ), resp., f^{-1} (A) ∈ S- rg*b -LC**(X,μ)) for each A ∈ S-rg*b -LC (Y, σ) (resp., A∈ S- rg*b -LC* (Y, σ), resp., A ∈ S-rg*b -LC* (Y, σ))**.**

Theorem: 4.3

Let (X, τ) and (Y,σ) be two topological spaces and μ be a supra topology associated with τ. Let f**:** (X, τ) → (Y,σ) be a function**.** If f is S- rg*b -L*-continuous or S- rg*b -L**-continuous, then it is S- rg*b -L-continuous.

Proof:

The proof is trivial from the Definitions.

Theorem: 4.4

Let (X, τ) and (Y,σ) be two topological spaces and μ and λ be supra topologies associated with τ and σ respectively . Let f**:** (X, τ) → (Y,σ) be a function**.** If f is said to be S- rg*b -L-irresolute (resp., S- rg*b -L*- irresolute, resp., S- rg*b -L**-irresolute), then it is S- rg*b -L-continuous (resp., S- rg*b -L* - continuous, resp., S- rg*b -L** - continuous).

Proof:

The proof is trivial from the Definitions.

Theorem: 4.5

Let f**:** (X, τ) → (Y,σ) be supra rg*b-LC-continuous and A be supra rg*b-closed in X**.** Then the restriction f / A : A → Y is S-rg*b-L-continuous.

Proof:

Let U be supra open in Y. Then $f^{-1}(U)$ in supra rg*b-LC in X. So $f^{-1}(U)$ = G∩F where G is supra rg*b-open and F is supra rg*b-closed in X. Now $(f / A)^{-1}(U)$ = (G∩F)∩A = G∩(F∩A) (resp. (G∩A)∩F) where F∩A is supra rg*b-closed (resp. G∩A is supra rg*b-open) in X. Therefore $(f / A)^{-1}(U)$ is supra rg*b-LC in X. Hence f / A is supra rg*b-L-continuous.

Theorem: 4.6

A space (X, μ) is supra rg*b-submaximal if and only if every function having (X, μ) as domain is supra rg*b-L-continuous.

Proof:

Necessity: Let (X, μ) be supra rg*b-submaximal. Then rg*b-LC(X) = P(X) by Theorem: 3.19. Let f**:** (X, μ) → (Y, σ) be a function and A ∈σ. Then f^{-1}(A)∈S- rg*b-LC(X) and so f is S-rg*b-L-continuous.

Sufficiency: Let every function having (X, μ) as domain be supra rg*b-L-continuous. Let Y= {0, 1} and σ = {ϕ, Y, {0}}. Let A ⊂ (X, μ) and f**:** (X, μ) → (Y, σ) be defined by f(x) = 0 if x ∈A and f(x) = 1 if x ∉ A. Since f is supra rg*b-L-continuous, A∈S- rg*b-LC(X, μ). Therefore P(X) = S- rg*b-LC(X) and so X is supra rg*b-submaximal by Theorem: 3.19.

Theorem: 4.7

If g: X → Y is S- rg*b-L-continuous and h: Y → Z is supra continuous, then hog : X → Z is S- rg*b-L-continuous.

Proof:

Let g: X → Y is S- rg*b-L – continuous and h : Y → Z is supra continuous. By the Definitions, g^{-1}(V) ∈ S- rg*b-LC (X), V ∈Y and h^{-1} (W) ∈Y, W∈Z. Let W ∈ Z. Then $(hog)^{-1}$ (W) = (g^{-1} h^{-1}) (W) = g^{-1} (h^{-1}(W)) = g^{-1}(V), for V ∈ Y. From this, $(hog)^{-1}$(W) = g^{-1}(V) ∈ S- rg*b-LC (X), W ∈ Z. Therefore, hog is S- rg*b-L- continuous.

Theorem: 4.8

If g : X → Y is S- rg*b-L – irresolute and h : Y → Z is S-rg*b-L-continuous , then h o g : X → Z is S- rg*b-L – continuous.

Proof:

Let g : X → Y is S- rg*b-L – irresolute and h : Y → Z is S-rg*b-L-continuous. By the Definitions, g^{-1}(V) ∈ S- rg*b-LC(X) , for V ∈S- rg*b-LC (Y) and h^{-1}(W) ∈S- rg*b-LC (Y) , for W∈ Z. Let W ∈ Z. Then $(hog)^{-1}$(W) = (g^{-1} h^{-1}) (W) = g^{-1}(h^{-1}(W)) = g^{-1}(V), for V ∈ S- rg*b-LC(Y). This implies, $(hog)^{-1}$(W) = g^{-1}(V) ∈ S- rg*b-LC (X), W ∈ Z. Hence hog is S-rg*b-L- continuous.

Theorem: 4.9:

If g : X → Y and h : Y → Z are S- rg*b-L – irresolute , then h o g : X → Z is also S- rg*b-L – irresolute.

Proof:

By the hypothesis and the Definitions, we have g^{-1}(V) ∈ S-rg*b-LC (X), for V ∈S- rg*b-LC (Y) and h^{-1}(W) ∈S- rg*b-LC (Y), for W∈ S- rg*b-LC(Z). Let W ∈S- rg*b-LC(Z). Then $(hog)^{-1}$(W) = (g^{-1} h^{-1}) (W) = g^{-1}(h^{-1}(W)) = g^{-1}(V), for V ∈ S-rg*b-LC(Y).Therefore, $(hog)^{-1}$(W) = g^{-1}(V) ∈ S- rg*b-LC (X), W ∈ S- rg*b-LC(Z). Thus hog is S- rg*b-L – irresolute.

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