Generalized Alpha Closed sets in Neutrosophic topological spaces

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ABSTRACT

This paper committed to the investigation of Neutrosophic topological spaces. In this paper Generalized Alpha Closed Sets and Generalized Alpha Open Sets are presented. Some of its properties are contemplated.

Keywords: Neutrosophic Set, Generalized Neutrosophic Set, Neutrosophic Topology

Introduction and Preliminaries

The idea of neutrosophic sets was first presented by Smarandache [7, 8] as a generalization of intuitionistic fuzzy sets where we have the degree of membership, the degree of indeterminacy and the degree of non – membership of each component in X.

Definition 1 [7]

A Neutrosophic set A on the universe of discourse X is defined as

$$A = \{\langle x, \mu_A(x), \sigma_A(x), \gamma_A(x)\rangle : x \in X\}$$

Where $\mu_A, \sigma_A, \gamma_A$: $X \to]\,^-0, 1+$ [and $^-0 \leq \mu_A(x) + \sigma_A(x) + \gamma_A(x) \leq 3^+$ From a philosophical point of view, the Neutrosophic set takes the value from real standard or non-standard subsets of] $^-0$, 1+ [. But in real life application in science and engineering problems it is difficult to use Neutrosophic set with values from real standard or non-standard subset of] $^-0$, 1+ [. Hence we consider the Neutrosophic set which takes the value from the subsets of [0,1]. Set of all Neutrosophic set over X is denoted by $\mathcal{N}(X)$.

Definition 2 [12]

Let A, B $\in \mathcal{N}(X)$, Then

i. (Inclusion) If $\mu_A(x) \leq \mu_B(x)$, $\sigma_A(x) \geq \sigma_B(x)$ and $\gamma_A(x) \geq \gamma_B(x)$ for all $x \in X$, then A is Neutrosophic subset of B and denoted by $A \sqsubseteq B$.

ii. (Equality) If $A \sqsubseteq B$ and $B \sqsubseteq A$, then A=B.

iii. (Intersection) Neutrosophic intersection of A and B, denoted by $A \sqcap B$. And defined by

$$A \sqcap B = \{\langle x, \mu_A(x) \wedge \mu_B(x), \sigma_A(x) \vee \sigma_B(x), \gamma_A(x) \vee \gamma_B(x)\rangle : x \in X\}.$$

iv. (Union) Neutrosophic union of A and B, denoted by $A \sqcup B$. and defined by

$$A \sqcup B = \{\langle x, \mu_A(x) \vee \mu_B(x), \sigma_A(x) \wedge \sigma_B(x), \gamma_A(x) \wedge \gamma_B(x)\rangle : x \in X\}.$$

v. (Complement) Neutrosophic complement of A denoted by A^c and defined by

$$A^c = \{\langle x, \gamma_A(x), 1 - \sigma_A(x), \mu_A(x)\rangle : x \in X\}$$

vi. (Universal Set) If $\mu_A(x) = 1$, $\sigma_A(x) = 0$ and $\gamma_A(x) = 0$ for all $x \in X$, A is said to be Neutrosophic universal set, denoted by $\widetilde{X}$.

vii. (Empty Set) If $\mu_A(x) = 0$, $\sigma_A(x) = 1$ and $\gamma_A(x) = 1$ for all $x \in X$, A is said to be Neutrosophic empty set, denoted by $\widetilde{\emptyset}$.

Definition 3 [12]

Let $\tau \subseteq \mathcal{N}(X)$, then τ is called a Neutrosophic topology on X if

i. $\tilde{X}$ and $\tilde{\emptyset}$ belongs to τ.

ii. The union of any number of Neutrosophic sets in τ belongs to τ.

iii. The intersection of any number of Neutrosophic sets in τ belongs to τ.

The pair (X, τ) is called a Neutrosophic topological space over X. Moreover the members of τ are said to be Neutrosophic open sets in X. If $A^c \in \tau$ then $A \in \mathcal{N}(X)$ is said to be Neutrosophic closed set in X.

Definition 4 [12]

Let (X,τ) be a neutrosophic topological space over X and $A \in \mathcal{N}(X)$. Then, the neutrosophic interior of A, denoted by int(A) is the union of all neutrosophic open subsets of A, Clearly int(A) is the biggest neutrosophic open sets over X which containing A.

Definition 5 [12]

Let (X,τ) be a neutrosophic topological space over X and $A, B \in \mathcal{N}(X)$. Then,

i. $int(\tilde{\emptyset}) = \tilde{\emptyset}$ and $int(\tilde{X}) = \tilde{X}$.

ii. $int(A) \sqsubseteq A$.

iii. A is neutrosophic open set if and only if A =int(A)

iv. int(int(A)) = int(A)

v. $A \sqsubseteq B$ implies $int(A) \sqsubseteq int(B)$.

vi. $int(A) \sqcup int(B) \sqsubseteq int(A \sqcup B)$

vii. $int(A \sqcap B) = int(A) \sqcap int(B)$

Definition 6 [12]

Let (X,τ) be a neutrosophic topological space over X and $A \in \mathcal{N}(X)$. Then, the neutrosophic closure of A, denoted by cl(A) is the intersection of all neutrosophic closed super sets of A, Clearly cl(A) is the smallest neutrosophic closed sets over X which contains A

Definition 7 [12]

Let (X,τ) be a neutrosophic topological space over X and $A, B \in \mathcal{N}(X)$. Then,

i. $cl(\tilde{\emptyset}) = \tilde{\emptyset}$ and $cl(\tilde{X}) = \tilde{X}$.

ii. $A \sqsubseteq cl(A)$.

iii. A is neutrosophic closed set if and only if A = cl(A)

iv. cl(cl(A)) = cl(A)

v. $A \sqsubseteq B$ implies $cl(A) \sqsubseteq cl(B)$.

vi. $cl(A \sqcup B) = cl(A) \sqcup cl(B)$

vii. $cl(A \sqcap B) \sqsubseteq cl(A) \sqcap cl(B)$

Definition 8 [12]

Let (X,τ) be neutrosophic topological space over X and $A, B \in \mathcal{N}(X)$. Then

i. $int(A^c) = (cl(A))^c$

ii. $cl(A^c) = (int(A))^c$

Definition 9 [1]

A neutrosophic set A in a neutrosophic topological space (X, τ) is called neutrosophic semi open set (briefly NSOS) if $A \subseteq Ncl(Nint(A))$

Definition 10 [1]

A neutrosophic set A in a neutrosophic topological space (X, τ) is called neutrosophic semi closed set (briefly NSCS) if $Nint(Ncl(A)) \subseteq A$

Definition 11 [1]

A neutrosophic set A in a neutrosophic topological space (X, τ) is called neutrosophic α −open set (briefly NαOS) if $A \subseteq Nint\left(Ncl\left(Nint(A)\right)\right)$.

Definition 12 [1]

A neutrosophic set A in a neutrosophic topological space (X, τ) is called neutrosophic α −closed set (briefly NαCS) if $Ncl\left(Nint(Ncl(A))\right) \subseteq A$.

Definition 13 [1]

A neutrosophic set A in a neutrosophic topological space (X, τ) is called neutrosophic pre open (briefly NPOS) if $A \subseteq Nint\left(Ncl(A)\right)$.

Definition 14 [1]

A neutrosophic set A in a topological space (X, τ) is called neutrosophic pre closed (briefly NPCS) if $Ncl\left(Nint(A)\right) \subseteq A$.

Definition 15 [1]

A neutrosophic set A in a neutrosophic topological space (X, τ) is called neutrosophic regular open (briefly NROS) if $A = Nint\left(Ncl(A)\right)$.

Definition 16 [1]

A neutrosophic set A in a neutrosophic topological space (X, τ) is called neutrosophic regular closed (briefly NRCS) if $A = Ncl\left(Nint(A)\right)$.

Definition 17 [1]

A neutrosophic set A in a neutrosophic topological space (X, τ) is called neutrosophic semi pre open or β −open (briefly NβOS) if $A \subseteq Ncl(Nint(Ncl(A)))$

Definition 18 [11]

A neutrosophic set A in a neutrosophic topological space (X, τ) is called neutrosophic ω closed (N_{ω} −closed set for short) if $Ncl(A) \subseteq G$ whenever $A \subseteq G$ and G is N_{ω} −closed.

Definition 19 [11]

A neutrosophic set A in X is called N_{ω} −open in X if A^c is an N_{ω} −closed in X.

1. Generalized Alpha Closed Sets in Neutrosophic

Definition 1.1.

Neutrosophic set A in (X,τ) is said to be Neutrosophic generalized alpha closed sets (NGαCS in short) if $Ntr_{\alpha cl}(A) \subseteq U$ whenever $A \subseteq U$ and U is NαOS in (X,τ).

The family of all NGαCS of a Neutrosophic topologĝical space (X,τ) is denoted by NGαCS(X).

Note 1.1

In this paper we denote neutrosophic closure as Ntr_{cl} neutrosophic interior as Ntr_{int} and neutrosophic alpha closure as $Ntr_{\alpha cl}$.

Example 1.2:

Let X = {a, b} and $\tau = \{\emptyset, X, G\}$ is a neutrosophic topology on X. Take G = $\{\langle x, (0.4, 0.6, 0.7), (0.8, 0.7, 0.8)\rangle\}$. Here the only $\alpha-$open set are $\emptyset, X, G$ then the neutrosophic set A= $\{\langle x, (0.6, 0.6, 0.7), (0.8, 0.7, 0.8)\rangle\}$ is NGαCS in (X,τ).

Theorem 1.3: Every Neutrosophic Closed Set (NCS in short) in (X,τ) is NGαCS, but not conversely.

Proof:

Let A be any set which contained in U and U is NαOS in (X,τ). Since $Ntr_{\alpha cl}(A) \subseteq Ntr_{cl}(A)$ and A is NCS, $Ntr_{\alpha cl}(A) \subseteq Ntr_{cl}(A) = A \subseteq U$. Therefore A is an NGαCS in X.

Example 1.4:

Let X = {a, b} and $\tau = \{\emptyset, X, G\}$ is a neutrosophic topology and (X, τ) on X. Take G= $\{\langle x, (0.3, 0.5, 0.3), (0.3, 0.5, 0.4)\rangle\}$. Let A= $\{\langle x, (0.6, 0.5, 0.3), (0.5, 0.5, 0.4)\rangle\}$ be any NS in X, here $Ntr_{\alpha cl}(A) \subseteq X$ whenever $A \subseteq X$ for all NαOS G in X. A is NGαCS. But not a NCS in X. since $Ntr_{cl}(A) = G^c \neq A$

Theorem 1.5: Every Neutrosophic α-closed Set (NαCS in short) is NGαCS but not conversely.

Proof:

Let A be any set which contained in U and U is NαOS in (X,τ). By the hypothesis $Ntr_{\alpha cl}(A) = A$. Hence $Ntr_{\alpha cl}(A) \subseteq U$. Therefore A is NGαCS in X.

Example 1.6:

Let X = {a, b} and $\tau = \{\emptyset, X, G\}$ is a neutrosophic topology and (X, τ) on X. Take G = $\{\langle x, (0.3, 0.5, 0.3), (0.3, 0.5, 0.4)\rangle\}$.Let A= $\{\langle x, (0.6, 0.5, 0.3), (0.5, 0.5, 0.4)\rangle\}$ be any NS in X, here $Ntr_{\alpha cl}(A) \subseteq X$ whenever $A \subseteq X$ for all NαOS G in X. therefore A is NGαCS. But not a NGαCS in X. since $Ntr_{cl}(A) = G^c \not\subseteq A$.

Theorem 1.7: Every Neutrosophic Regular Closed Set (NRCS in short) is an NGαCS but not conversely.

Proof:

Let A is a NRCS in (X,τ). By Definition, A= $Ntr_{cl}(Ntr_{int}(A))$, This implies $Ntr_{cl}(A) = Ntr_{cl}(Ntr_{int}(A))$. Therefore $Ntr_{cl}(A) = A$. That is A is an NCS in X. By theorem 1.3 A is an NGαCS in X.

Example 1.8:

Let X = {a, b} and $\tau = \{\emptyset, X, G\}$ is a neutrosophic topology on X. Take G = $\{\langle x, (0.3, 0.5, 0.3), (0.3, 0.5, 0.4)\rangle\}$. Let A= $\{\langle x, (0.8, 0.5, 0.3), (0.5, 0.5, 0.5)\rangle\}$ be any NS in X, here A is a NGαCS. But not a NRCS in (X,τ), since $Ntr_{cl}(Ntr_{int}(A)) = G^c \neq A$

Example 1.9:

Let X = {a, b} and $\tau = \{\emptyset, X, G\}$ is a neutrosophic topology and (X, τ)on X. Take G = $\{\langle x, (0.4, 0.4, 0.4), (0.6, 0.6, 0.6)\rangle\}$.Let A= $\{\langle x, (0.5, 0.5, 0.5), (0.3, 0.7, 0.7)\rangle\}$ be any NS in X, here A is a NGCS in X. consider the NαOS $G_1 = \{\langle x, (0.2, 0.2, 0.3), (0.8, 0.6, 0.7)\rangle\}$. Here $A \subseteq G_1$ but $Ntr_{\alpha cl}(A) \not\subseteq G_1$. Hence A is not a NGαCS in (X, τ).

Theorem 1.10: Every Neutrosophic Generalized α −closed Set (NGαCS in short) is an NαGCS in X. But converse is not true in general.

Proof:

Let A be any set which contained in U and U is NαOS in (X,τ). Since every open set is α open set we have $Ntr_{\alpha cl}(A) \subseteq U$ whenever $A \subseteq U$ and U is an NOS in (X,τ). Hence A is an NαGCS in X.

Example 1.11:

Let $X = \{a, b\}$ and $\tau = \{\emptyset, X, G\}$ is a neutrosophic topology on X. Where $G = \{\langle x, (0.2, 0.2, 0.3), (0.8, 0.6, 0.7)\rangle\}$. Let $A = \{\langle x, (0.6, 0.2, 0.4), (0.9, 0.6, 0.8)\rangle\}$ be any NS in X, here A is a NαGCS in X consider the NαOS $G_1 = \{\langle x, (0.3, 0.2, 0.8), (0.7, 0.7, 0.3)\rangle\}$. Here $A \subseteq G_1$ but $Ntr_{\alpha cl}(A) \not\subseteq G_1$. Hence A is not a NGαCS in (X, τ)

Theorem 1.12: Every Neutrosophic Generalized α −closed Set (NGαCS in short) is NSGCS but its converse may not be true.

Proof:

Let A be any set which contained in U and U is an NSOS in (X,τ). By hypothesis $Ntr_{\alpha cl}(A) \subseteq A$, which implies $Ntr_{cl}(Ntr_{int}(Ntr_{cl}(A))) \subseteq U$. That is $Ntr_{int}(Ntr_{cl}(A)) \subseteq U$, which implies $A \cup Ntr_{int}(Ntr_{cl}(A)) \subseteq U$. Then $Ntr_{scl}(A) \subseteq U$, U is NSOS. Therefore A is NSGCS in (X,τ)

Example 1.13:

Let $X = \{a, b\}$ and $\tau = \{\emptyset, X, G\}$ is a neutrosophic topology on X. Take $G = \{\langle x, (0.3, 0.4, 0.6), (0.6, 0.6, 0.4)\rangle\}$.Here only α −open sets are $\{\emptyset, X\}$.Let $A = \{\langle x, (0.3, 0.2, 0.5), (0.6, 0.6, 0.8)\rangle\}$ be any NS in X. Then $Ntr_{scl}(A) = X$. Clearly $Ntr_{scl}(A) \subseteq X$ whenever $A \subseteq X$ for all NSOS G in X. A is NSGCS in (X,τ). But not a NGαCS in X since $Ntr_{\alpha cl}(A) = G^c \not\subseteq G$

Theorem 1.14: Every Neutrosophic Generalized α −closed Set (NGαCS in short) is NGSCS but its converse may not be true.

Proof:

Let A be any set which contained in U and U is an NαOS in (X,τ). By hypothesis $Ntr_{\alpha cl}(A) \subseteq U$, which implies $Ntr_{cl}(Ntr_{int}(Ntr_{cl}(A))) \subseteq U$. That is $Ntr_{int}(Ntr_{cl}(A)) \subseteq U$, which implies $A \cup Ntr_{int}(Ntr_{cl}(A)) \subseteq U$. Therefore $Ntr_{scl}(A) \subseteq U$, U is NOS. Therefore A is NGSCS of (X,τ).

Example 1.15:

Let $X = \{a, b\}$ and $\tau = \{\emptyset, X, G\}$ is a neutrosophic topology (X, τ) on X. where $G = \{\langle x, (0.3, 0.2, 0.3), (0.8, 0.6, 0.7)\rangle\}$. Here only α −open sets are $\{\emptyset, X\}$ Let $A = \{\langle x, (0.3, 0.2, 0.6), (0.8, 0.9, 0.8)\rangle\}$ be any NS in X, here $Ntr_{scl}(A) = X$. Clearly $Ntr_{scl}(A) \subseteq X$ whenever $A \subseteq X$ for all NOS G in X. A is NGSCS in (X,τ). But not a NGαCS since $Ntr_{\alpha cl}(A) = G^c \neq A$

Theorem 1.16: Every Neutrosophic Generalized α −closed Set (NGαCS in short) is Neutrosophic Generalized Pre Closed Set (NGPCS in short) but its converse may not be true.

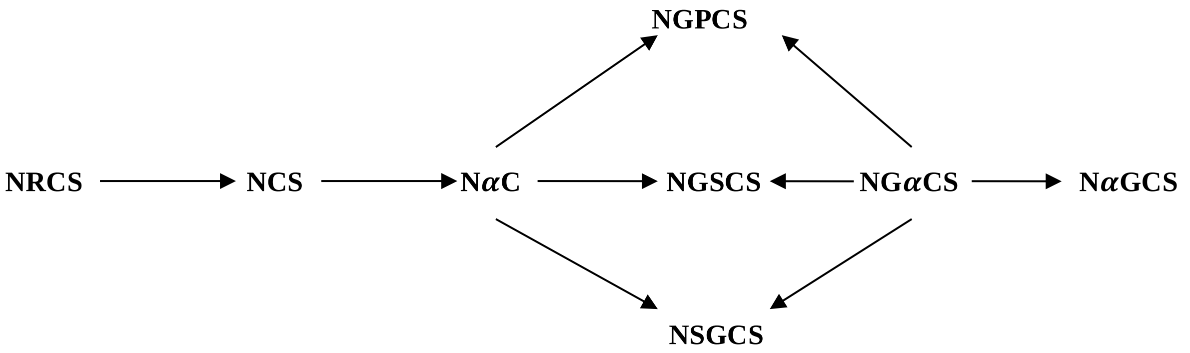
Proof:

Let A be any set which contained in U and U is an NαOS in (X,τ), By hypothesis $Ntr_{\alpha cl}(A) \subseteq U$, which implies $Ntr_{cl}(Ntr_{int}(Ntr_{cl}(A))) \subseteq U$. That is $Ntr_{cl}(Ntr_{int}(A)) \subseteq U$, which implies $A \cup Ntr_{cl}(Ntr_{int}(A)) \subseteq U$. Therefore $Ntr_{pcl}(A) \subseteq U$, U is NOS. Therefore A is NGPCS in (X,τ).

Example 1.17:

Let $X = \{a, b\}$ and $\tau = \{\emptyset, X, G\}$ is a neutrosophic topology on X. Where $G = \{\langle x, (0.6, 0.2, 0.8), (0.2, 0.6, 0.1)\rangle\}$. Here only α −open sets are $\{\emptyset, X\}$.Let $A = \{\langle x, (0.3, 0.4, 0.4), (0.4, 0.6, 0.5)\rangle\}$ be any NS in X, here $Ntr_{pcl}(A) \subseteq X$. Therefore A is a NGPCS in (X,τ) but not a NGαCS since $Ntr_{\alpha cl}(A) = G^c \not\subseteq G$

The following diagram implications are true:



Remark1.18:

A NP closedness in independent of an NGα closedness.

Example 1.19:

Let X = {a, b} and $\tau = \{\emptyset, X, G\}$ is a neutrosophic topology on X. Where G = $\{\langle x, (0.3, 0.4, 0.5), (0.8, 0.6, 0.9)\rangle\}$. Here only $\alpha -$open sets are $\{\emptyset, X\}$ Let A= $\{\langle x, (0.5, 0.6, 0.4), (0.8, 0.3, 0.2)\rangle\}$ be any NGαCS(x), But not a NPCS(X) since $Ntr_{cl}(Ntr_{int}(A)) = G^c \nsubseteq A$

Example 1.20:

Let X = {a, b} and $\tau = \{\emptyset, X, G\}$ is a neutrosophic topology on X. Where G = $\{\langle x, (0.2, 0.1, 0.3), (0.8, 0.4, 0.7)\rangle\}$. A= $\{\langle x, (0.4, 0.2, 0.4), (0.7, 0.6, 0.8)\rangle\}$ be any NPCS(x), But not a NGαCS(x) since $Ntr_{\alpha cl}(A) = G^c \nsubseteq G$

Remark 1.21:

A neutrosophic closed set and neutrosophic generalized $\alpha -$ closed set are independent to each other.

Example 1.22:

Let X = {a, b} and $\tau = \{\emptyset, X, G\}$ is a neutrosophic topology on X. Where G = $\{\langle x, (0.2, 0.2, 0.3), (0.8, 0.6, 0.7)\rangle\}$.Let A= $\{\langle x, (0.5, 0.8, 0.4), (0.5, 0.5, 0.8)\rangle\}$ be any NGαCS(x), here $Ntr_{\alpha cl}(A) \subseteq G$ But not a NSCS(X) since $Ntr_{int}(A) = X \nsubseteq A$.

Example 1.23:

Let X = {a, b} and $\tau = \{\emptyset, X, G\}$ is a neutrosophic topology on X. Where G = $\{\langle x, (0.3, 0.2, 0.3), (0.5, 0.6, 0.5)\rangle\}$.Let A= $\{\langle x, (0.1, 0.2, 0.4), (0.3, 0.6, 0.8)\rangle\}$ be any NSCS(X) but not a NGαCS(x) since $Ntr_{\alpha cl}(A) = G^c \nsubseteq G$.

Remark 1.24:

The intersection of any two NGαCS is not a NGαCS in general as seen from the following example.

Example 1.25:

Let X = {a, b} and $\tau = \{\emptyset, X, G\}$ is a neutrosophic topology on X. Where G = $\{\langle x, (0.1, 0.2, 0.1), (0.8, 0.1, 0.7)\rangle\}$. Let A= $\{\langle x, (0.6, 0.7, 0.4), (0.7, 0.6, 0.8)\rangle\}$, B = $\{\langle x, (0.3, 0.2, 0.4), (0.4, 0.6, 0.8)\rangle\}$ are NGαCS but $A \cap B$ is not a NGαCS in X.

Theorem 1.26: If A is an NOS and NGαCS in(X,τ), then A is s NαCS in X.

Proof:

Let A is a NOS in X. Since A ⊆ A, by hypothesis $Ntr_{\alpha cl}(A) \subseteq A$. But from the definition $A \subseteq Ntr_{\alpha cl}(A)$. Therefore $Ntr_{\alpha cl}(A) = A$. Hence A is a NαCS(X).

2. Generalized Alpha Open Sets in Neutrosophic

In this section we introduce neutrosophic generalized alpha open set and studied some of its properties.

Definition 2.1:

A neutrosophic set A is said to be neutrosophic generalized alpha open set (NGαOP in short) in (X,τ) if the the complement of A^c is a NGαCS in X.

The family of all NGαOS of a NTS (X,τ) is denoted by NGαO(X)

Note

In this paper we denote neutrosophic closure as Ntr_{cl} neutrosophic interior as Ntr_{int} and neutrosophic alpha closure as $Ntr_{\alpha cl}$.

Theorem 2.2:

For any NTS (X,τ), we have the following

- Every NOS is a NGαOS
- Every NαOS is a NGαOS,
- Every NROS is a NGαOS. But the converses are not true in general.

Proof:

Straight forward

Example 2.3:

Let X = {a, b} and $\tau = \{\emptyset, X, G\}$ is a neutrosophic topology on X. Where G = $\{\langle x, (0.2\ ,0.3\ ,0.8), (0.7, 0.6, 0.7)\rangle\}$. Here only α −open sets are $\{\emptyset, X\}$. Let A= $\{\langle x, (0.6, 0.7, 0.4), (0.3, 0.4, 0.3)\rangle\}$, be any NS in X. A is an NGαOS, but not an NOS in X.

Example 2.4

Let X = {a, b} and $\tau = \{\emptyset, X, G\}$ is a neutrosophic topology on X. Where G = $\{\langle x, (0.3\ ,0.2\ ,0.7), (0.6, 0.6, 0.7)\rangle\}$. Here only α −open sets are $\{\emptyset, X\}$. Let A= $\{\langle x, (0.6, 0.6, 0.4), (0.3, 0.2, 0.2)\rangle\}$, be any NS in X. A is an NGαOS, but not an NαOS in X

Example 2.5

Let X = {a, b} and $\tau = \{\emptyset, X, G\}$ is a neutrosophic topology on X. Where G = $\{\langle x, (0.1\ ,0.2\ ,0.3), (0.9, 0.6, 0.7)\rangle\}$. Here only α −open sets are $\{\emptyset, X\}$. Let A= $\{\langle x, (0.7, 0.2, 0.4), (0.8, 0.6, 0.7)\rangle\}$, be any NS in X. A is an NGαOS, but not an NROS in X

Thorem 2.6

For any NTS (X,τ), we have the following:

- Every NGαOS is a NGSOS
- Every NGαOS is a NSGOS
- Every NGαOS is a NGPOS. But the converses are not to be true in general.

Proof:

Straight forward

Example 2.7:

Let X = {a, b} and $\tau = \{\emptyset, X, G\}$ is a neutrosophic topology on X. Where G = $\{\langle x, (0.2\ ,0.4\ ,0.3), (0.7, 0.7, 0.7)\rangle\}$. Here only α −open sets are $\{\emptyset, X\}$. Let A= $\{\langle x, (0.5, 0.2, 0.5), (0.4, 0.6, 0.2)\rangle\}$, be any NS in X. A is an NGSOS, but not an NGαOS in X

Example 2.8:

Let X = {a, b} and $\tau = \{\emptyset, X, G\}$ is a neutrosophic topology on X. Where G = $\{\langle x, (0.4\ ,0.2\ ,0.3), (0.3, 0.2, 0.1)\rangle\}$. Here only α −open sets are $\{\emptyset, X\}$. Let A= $\{\langle x, (0.3, 0.2, 0.3), (0.3, 0.6, 0.1)\rangle\}$, be any NS in X. A is an NSGOS, but not an NGαOS in X

Example 2.9

Let X = {a, b} and $\tau = \{\emptyset, X, G\}$ is a neutrosophic topology on X. Where G = $\{\langle x, (0.2\ ,0.1\ ,0.3), (0.2, 0.6, 0.7)\rangle\}$. Here only α −open sets are $\{\emptyset, X\}$. Let A= $\{\langle x, (0.6, 0.7, 0.4), (0.3, 0.6, 0.8)\rangle\}$, be any NS in X. A is an NGPOS, but not an NGαOS in X

Remark 2.10

The union of any two any NGαOS is not an NGαOS in general as seen from following example.

Example 2.11:

Let X = {a, b} and $\tau = \{\emptyset, X, G\}$ is a neutrosophic topology on X. Where G = $\{\langle x, (0.2\ ,0.2\ ,0.3), (0.8, 0.6, 0.7)\rangle\}$. Here only α −open sets are $\{\emptyset, X\}$.Let A= $\{\langle x, (0.5, 0.2, 0.4), (0.6, 0.7, 0.8)\rangle\}$, and B= $\{\langle x, (0.7, 0.2, 0.4), (0.8, 0.6, 0.7)\rangle\}$ are NGαOS but A ∪ B is not an NGαOS.

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