Neutrosophic Sets and Systems, Vol. 36, 2020
University of New Mexico

Neutrosophic g*-Closed Sets and its maps

A.Atkinswestley[1] and S.Chandrasekar[2*]

[1]Department of Mathematics, Roever College of Engineering and Technology, Elambalur,Perambalur(DT), Tamil Nadu, India E-mail: ats.wesly@gmail.com

[2]Department of Mathematics, Arignar Anna Government Arts College, Namakkal(DT),Tamil Nadu, India. E-mail: chandrumat@gmail.com.

*Correspondence: chandrumat@gmail.com;

Abstract: Topology is one of the classical subjects in Mathematics. A lot of researchers have published their ideas.As a generalization of topological concepts many new kind of closed and open sets are published continuously. Salama presented Neutrosophic topological spaces by using Smarandache 's Neutrosophic sets. Many Researchers introduced so many closed sets in Neutrosophic topological spaces. Purpose of this research paper is we introduce Neutrosophic g*-Closed sets and Neutrosophicg*-open sets in Neutrosophic topological spaces. Also we study about study about mappings of Neutrosophic g*-Closed sets

.

Keywords: Neutrosophic g-Closed sets Neutrosophic g*-Closed sets, Neutrosophicg*-open sets, Neutrosophic g*-continuous.

1. Introduction

Smarandache [10,11] characterized the Neutrosophic set on three segment Neutrosophic sets(T Truth, I-Indeterminacy, F-Falsehood). Neutrosophic topological spaces(NS-T-S) presented by Salama [19,20]et al. Neutrosophic have wide scope of constant applications for the fields of Electrical & Electronic, Artificial Intelligence, Mechanics, Computer Science, Information Systems, Applied Mathematics , basic leadership. Prescription and Management Science and so on.

Neutrosophic semi closed, α- closed, pre closed and regular closed sets are introduced by I. Arokiarani[6] et al.,R.Dhavaseelan[8] et al. introduced Neutrosophic g closed sets and gα closed sets .Point of this paper is R .Dhavaseelan[9] and S.Jafari, are introduced Generalized Neutrosophic Closed sets . D.Jayanthi [13]presented αG Closed Sets in Neutrosophic Topological Spaces, V.K.Shanthi [22] developed Neutrosophic gs and sg closed set. C.Mahesawri[14,15] et al introduced Neutrosophic gb closed sets.

Aim of this present paper is, we introduce and study the concepts of Neutrosophic g*-Closed sets and Neutrosophic g*-open sets in Neutrosophic topological spaces. Also we study about mappings of Neutrosophicg*-Closed sets

2. Preliminaries

In this section, we recall required and necessary definition and results of Neutrosophic sets

Definition 2.1 [16,17] Let Nu_X^* be a non-empty fixed set. A Neutrosophic set W_1^* is a object having the form $W_1^* = \{< w, \mu_{W_1^*}(w), \sigma_{W_1^*}(w), \gamma_{W_1^*}(w) >: w \in Nu_X^*\}$,

$\mu_{W_1^*}(w)$- membership function

$\sigma_{W_1^*}(w)$- Indeterminacy function

$\gamma_{W_1^*}(w)$- Non-Membership function

Definition 2.2 [16,17]. Neutrosophic set $W_1^* = \{< w, \mu_{W_1^*}(w), \sigma_{W_1^*}(w), \gamma_{W_1^*}(w) >: w \in Nu_X^*\}$, on Nu_X^* and $\forall w \in Nu_X^*$ then complement of W_1^* is

$W_1^{*C} = \{< w, \gamma_{W_1^*}((w)), 1 - \sigma_{W_1^*}(w), \mu_{W_1^*}(w) >: w \in Nu_X^*\}$

Definition 2.3 [16,17]. Let W_1^* and W_2^* are two Neutrosophic sets, $\forall w \in Nu_X^*$

$W_1^* = \{< w, \mu_{W_1^*}(w), \sigma_{W_1^*}(w), \gamma_{W_1^*}(w) >: w \in Nu_X^*\}$

$W_2^* = \{< w, \mu_{W_2^*}(w), \sigma_{W_2^*}(w), \gamma_{W_2^*}(w) >: w \in Nu_X^*\}$

Then $W_1^* \subseteq W_2^* \Leftrightarrow \mu_{W_1^*}(w) \leq \mu_{W_2^*}(w), \sigma_{W_1^*}(w) \leq \sigma_{W_2^*}(w) \ \& \ \gamma_{W_1^*}(w) \geq \gamma_{W_2^*}(w)\}$

Definition 2.4[16,17]. Let Nu_X^* be a non-empty set, and Let $W_1^*$and W_2^* be two Neutrosophic sets are

$W_1^* = \{< w, \mu_{W_1^*}(w), \sigma_{W_1^*}(w), \gamma_{W_1^*}(w) >: w \in Nu_X^*\}$, $W_2^* = \{< w, \mu_{W_2^*}(w), \sigma_{W_2^*}(w), \gamma_{W_2^*}(w) >: w \in Nu_X^*\}$

Then $W_1^* \cap W_2^* = \{< w, \mu_{W_1^*}(w) \cap \mu_{W_2^*}(w), \sigma_{W_1^*}(w) \cap \sigma_{W_2^*}(w), \gamma_{W_1^*}(w) \cup \gamma_{W_2^*}(w) >: w \in Nu_X^*\}$

$W_1^* \cup W_2^* = \{< w, \mu_{W_1^*}(w) \cup \mu_{W_2^*}(w), \sigma_{W_1^*}(w) \cup \sigma_{W_2^*}(w), \gamma_{W_1^*}(w) \cap \gamma_{W_2^*}(w) >: w \in Nu_X^*\}$

Definition 2.5 [19,20]. Let Nu_X^* be non-empty set and Nu_τ be the collection of Neutrosophic subsets of Nu_X^*satisfying the accompanying properties:

1.$0_{Nu}, 1_{Nu} \in Nu_\tau$

2. $Nu_{T_1} \cap Nu_{T_2} \in Nu_\tau$ for any $Nu_{T_1}, Nu_{T_2} \in Nu_\tau$

3. $\cup Nu_{T_i} \in Nu_\tau$ for every $\{Nu_{T_i} : i \in j\} \subseteq Nu_\tau$

Then the space (Nu_X^*, Nu_τ), is called a Neutrosophic topological space(NS-T-S) The component of Nu_τ are called Nu-OS (Neutrosophic open set)and its complement is Nu-CS(Neutrosophic closed set)

Example 2.6. Let Nu_X^* ={w} and $\forall w \in Nu_X^*$,$W_1^* = \langle w, \frac{6}{10}, \frac{6}{10}, \frac{5}{10} \rangle$, $W_2^* = \langle w, \frac{5}{10}, \frac{7}{10}, \frac{9}{10} \rangle$

$W_3^* = \langle w, \frac{6}{10}, \frac{7}{10}, \frac{5}{10} \rangle$,$W_4^* = \langle w, \frac{5}{10}, \frac{6}{10}, \frac{9}{10} \rangle$ Then the collection $Nu_\tau = \{0_{Nu}, W_1^*, W_2^*, W_3^*, W_4^* 1_{Nu}\}$ is called a NS-T-S on Nu_X^*.

Definition 2.7. Let (Nu_X^*, Nu_τ), be a NS-T-S

and $W_1^* = \{< w, \mu_{W_1^*}(w), \sigma_{W_1^*}(w), \gamma_{W_1^*}(w) >: w \in Nu_X^*\}$ bea Neutrosophic set in Nu_X^*. Then W_1^* is said to be

[1] Neutrosophic α-closed set [6] (Nu $-$ αCS in short) Nu-cl(Nu-in(Nu-cl(W_1^*)))⊆ W_1^*,

[2] Neutrosophic pre-closed set [22] (Nu-PCS in short) Nu -cl(Nu -in(W_1^*))⊆ W_1^*,

[3] Neutrosophic regular closed set [6] (Nu -RCS in short) Nu-cl(Nu-in(W_1^*))=W_1^*,

[4] Neutrosophic semi closed set [7] (Nu-SCS in short) Nu -in(Nu-cl(W_1^*))⊆ W_1^*,

[5] Neutrosophic generalized closed set [4] (Nu -GCS in short) Nu-cl(W_1^* ⊆ $\mathcal{H}$ whenever $W_1^* \subseteq \mathcal{H}$ and $\mathcal{H}$ is a Nu -OS, in Nu_X^*

[6] Neutrosophic α generalized closed set [13] (Nu-(αG)CS in short) Nuαcl(W_1^*)⊆ $\mathcal{H}$ whenever $W_1^* \subseteq \mathcal{H}$ And $\mathcal{H}$ is a Nu-OS, in Nu_X^*

[7] Neutrosophic generalized semi closed set [21](Nu-GSCS in short) Nu-Scl(W_1^*)⊆ $\mathcal{H}$ whenever $W_1^* \subseteq \mathcal{H}$ and $\mathcal{H}$ is a Nu-OS in Nu_X^*

[8] Neutrosophic semi generalized closed set[21](Nu-SGCS in short) if Nu scl(W_1^*) ⊆ $\mathcal{H}$ whenever $W_1^* \subseteq \mathcal{H}$ and $\mathcal{H}$ is a Nu-SOS in Nu_X^* ,

[9] Neutrosophic generalized alpha closed set[9]. (Nu-GαCS in short) if Nu-αcl(W_1^*) ⊆ $\mathcal{H}$ whenever $W_1^* \subseteq \mathcal{H}$ and $\mathcal{H}$ is a Nu-αOS in Nu_X^*

[10] Neutrosophic generalized b closed set[14](Nu-GbCS in short) if Nu-bcl(W_1^*) ⊆ $\mathcal{H}$ whenever $W_1^* \subseteq \mathcal{H}$ and $\mathcal{H}$ is a Nu-OS in Nu_X^*

Definition 2.8.[13] An (NS)S W_1^* in an (NS)TS (Nu_X^*, Nu_τ), is said to be aNeutrosophic weakly generalized closed set ((Nu-WG)CS) Nu-cl(Nu-in(W_1^*))⊆ $\mathcal{K}$ whenever $W_1^* \subseteq \mathcal{K}$, $\mathcal{K}$ is (Nu)OS in Nu_X^*.

Definition 2.9. (Nu_X^*, Nu_τ), be a NS-T-S and $W_1^* = \{< w, \mu_{W_1^*}(w), \sigma_{W_1^*}(w), \gamma_{W_1^*}(w) >: w \in Nu_X^*\}$ Nu_X^*.

Then Neutrosophic closure of W_1^* is Nu-Cl(W_1^*)= ∩ {$\mathcal{H}$: $\mathcal{H}$ is a Nu-CS in Nu_X^* and $W_1^* \subseteq \mathcal{H}$ }
Neutrosophic interior of W_1^* is Nu-Int(W_1^*)= ∪{M:M is a Nu-OS in Nu_X^* and M⊆ W_1^*}.

Definition 2.10.[2] Let (Nu_X^*, Nu_τ), be a NS-T-S and
$W_1^* = \{< w, \mu_{W_1^*}(w), \sigma_{W_1^*}(w), \gamma_{W_1^*}(w) >: w \in Nu_X^*\}$
Nu-Sint(W_1^*)= ∪{ $\mathcal{H}$/ $\mathcal{H}$ is a Nu-SOS in Nu_X^* and $\mathcal{H} \subseteq W_1^*$},
Nu -Scl(W_1^*)= ∩{ $\mathcal{K}$ / $\mathcal{K}$ is a Nu -SCS in Nu_X^* and $W_1^* \subseteq \mathcal{K}$ }.
Nu-αint(W_1^*)= ∪{ $\mathcal{H}$ / $\mathcal{H}$ is a Nu-αOS in Nu_X^* and $\mathcal{H} \subseteq W_1^*$},
Nu-αcl(W_1^*)= ∩{ $\mathcal{K}$ / $\mathcal{K}$ is a Nu-αCS in Nu_X^* and $W_1^* \subseteq \mathcal{K}$ }.

3. NEUTROSOPHIC G* CLOSED SETS

In this section we introduce Neutrosophic G*-Closed sets and studied some of its basic properties.

Definition 3.1: An NS W_1^* in (Nu_X^*, Nu_τ) is said to be a NeutrosophicG*-Closed set (Nu-G*CS in short) if Nu-cl(W_1^*) ⊆ $\mathcal{K}$ whenever $W_1^* \subseteq \mathcal{K}$ and $\mathcal{K}$ is Nu-GOS in (Nu_X^*, Nu_τ) .

The family of all Nu-G*CS's of A NTS (Nu_X^*, Nu_τ) is denoted by Nu-G*C(Nu_X^*).

Example 3.2: Let $Nu_X^* = \{w_1, w_2\}$ and let Nu_τ ={0_{Nu}, $\mathcal{K}$, 1_{Nu}}is NT on Nu_X^* ,where $\mathcal{K}$ = $\langle w, \left(\frac{3}{10}, \frac{5}{10}, \frac{7}{10}\right), \left(\frac{4}{10}, \frac{5}{10}, \frac{6}{10}\right)\rangle$.Then the NS $W_1^* = \langle w, \left(\frac{7}{10}, \frac{5}{10}, \frac{1}{10}\right), \left(\frac{6}{10}, \frac{5}{10}, \frac{0}{10}\right)\rangle$ is Nu-G*CS in (Nu_X^*, Nu_τ)

Theorem 3.3: Every Nu-CS is Nu-G*CS .

Proof: Let W_1^* be aNu-CS in (Nu_X^*, Nu_τ) . Then Nu-cl(W_1^*) = W_1^*. Let $W_1^* \subseteq \mathcal{K}$ and $\mathcal{K}$ is Nu-GOS in (Nu_X^*, Nu_τ) . Therefore Nu-cl(W_1^*) = $W_1^* \subseteq \mathcal{K}$. Thus W_1^* is Nu-G*CS inNu_X^*.

Example 3.4: Let Nu_X^*={w_1,w_2} and let Nu_τ={0_{Nu}, $\mathcal{K}$,1_{Nu}}is NT on Nu_X^*, where
$\mathcal{K}$ = $\langle w, \left(\frac{4}{10}, \frac{5}{10}, \frac{6}{10}\right), \left(\frac{2}{10}, \frac{5}{10}, \frac{7}{10}\right)\rangle$Then the NS $W_1^* = \langle w, \left(\frac{6}{10}, \frac{5}{10}, \frac{1}{10}\right), \left(\frac{7}{10}, \frac{5}{10}, \frac{1}{10}\right)\rangle$ is Nu-G*CS but not an

Nu-CS in Nu_X^*.

Theorem 3.5: Every Nu-G*CS is Nu-GCS.

Proof: Let W_1^* be aNu-G*CS in (Nu_X^*, Nu_τ) . Let $W_1^* \subseteq \mathcal{K}$ and $\mathcal{K}$ is Nu-OS in (Nu_X^*, Nu_τ) . Since every Nu-OS is Nu-GOS and since W_1^* is Nu-G*CS in Nu_X^*. Therefore Nu-cl(W_1^*)$\subseteq \mathcal{K}$ whenever $W_1^* \subseteq \mathcal{K}$, $\mathcal{K}$ is Nu-OS in Nu_X^*. Thus W_1^* is Nu-GCS in Nu_X^*.

Example 3.6: Let Nu_X^*={w_1,w_2, w_3} and

let Nu_τ={0_{Nu}, $\mathcal{K}$, 1_{Nu}}is NT on Nu_X^*, where $\mathcal{K}$ = $\langle w, \left(\frac{2}{10}, \frac{5}{10}, \frac{7}{10}\right), \left(\frac{5}{10}, \frac{5}{10}, \frac{4}{10}\right), \left(\frac{3}{10}, \frac{5}{10}, \frac{5}{10}\right)\rangle$.

Then the NS W_1^* =$\langle w, \left(\frac{5}{10}, \frac{5}{10}, \frac{5}{10}\right), \left(\frac{2}{10}, \frac{5}{10}, \frac{7}{10}\right), \left(\frac{3}{10}, \frac{5}{10}, \frac{6}{10}\right)\rangle$ is Nu-GCS but not an Nu-G*CS in Nu_X^*.

Theorem 3.7: Every Nu-G*CS is Nu-αGCS .

Proof: Let W_1^* be aNu-G*CS in (Nu_X^*, Nu_τ) . By Theorem 3.6 W_1^* is Nu-GCS in Nu_X^*. Since Nuα-cl(W_1^*) $\subseteq$ Nu-cl(W_1^*) and W_1^* is a Nu-GCS in Nu_X^*. Therefore Nuα -cl(W_1^*) $\subseteq$ Nu-cl(W_1^*)$\subseteq$ $\mathcal{K}$ whenever $W_1^* \subseteq \mathcal{K}$, $\mathcal{K}$ is Nu-OS in Nu_X^*. Thus W_1^* is Nu-αGCS in Nu_X^*.

Example 3.8: Let Nu_X^* = {w_1, w_2} and let Nu_τ ={0_{Nu}, $\mathcal{K}$, 1_{Nu}}is NT on Nu_X^*,

where $\mathcal{K}$ =$\langle w, \left(\frac{1}{10}, \frac{5}{10}, \frac{6}{10}\right), \left(\frac{4}{10}, \frac{5}{10}, \frac{5}{10}\right)\rangle$. Then the NS W_1^* =$\langle w, \left(\frac{3}{10}, \frac{5}{10}, \frac{4}{10}\right), \left(\frac{5}{10}, \frac{5}{10}, \frac{5}{10}\right)\rangle$

is Nu-αGCS but not an Nu-G*CS in Nu_X^*.

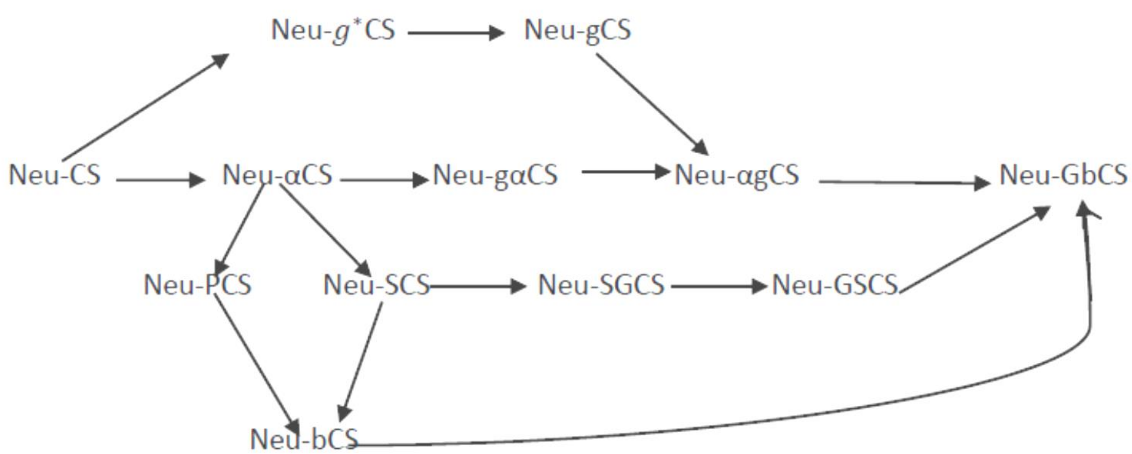
Theorem 3.9: Every Nu-RCS is Nu-G*CS .

Proof: Let W_1^* be a Nu-RCS in (Nu_X^*, Nu_τ) . Then W_1^* = Nu-cl(Nu-int(W_1^*)). Let $W_1^* \subseteq \mathcal{K}$ and $\mathcal{K}$ is Nu-GOS in(Nu_X^*, Nu_τ) .Therefore Nu-cl(W_1^*)$\subseteq$Nu-cl(Nu-int(W_1^*)). This implies Nu-cl(W_1^*)$\subseteq$ $W_1^* \subseteq \mathcal{K}$. Thus W_1^* is Nu-G*CS in Nu_X^*.

Example 3.10: Let Nu_X^* = {w_1, w_2} and let Nu_τ = {0_{Nu}, $\mathcal{K}$, 1_{Nu}}is NT on Nu_X^*,Where

$\mathcal{K}$ =$\langle w, \left(\frac{3}{10}, \frac{5}{10}, \frac{6}{10}\right), \left(\frac{7}{10}, \frac{5}{10}, \frac{3}{10}\right)\rangle$Then NS W_1^* =$\langle w, \left(\frac{7}{10}, \frac{5}{10}, \frac{3}{10}\right), \left(\frac{6}{10}, \frac{5}{10}, \frac{4}{10}\right)\rangle$ is Nu-G*CS but not an Nu-RCS in Nu_X^*.

Diagram:I



Remark 3.11:

Nu-G*CS is independent from Nu-αCS, Nu-SCS, Nu-PCS, and Nu-bCS as seen from the following example.

Example 3.12: Let Nu^*_X = {w_1, w_2} and let Nu_τ = {0_{Nu}, $\mathcal{K}$, 1_{Nu}}is NT on Nu^*_X, where

$\mathcal{K}$ =⟨w $\left(\frac{2}{10},\frac{5}{10},\frac{6}{10}\right),\left(\frac{4}{10},\frac{5}{10},\frac{5}{10}\right)$ ⟩. Then NS W^*_1=⟨w, $\left(\frac{3}{10},\frac{5}{10},\frac{5}{10}\right),\left(\frac{4}{10},\frac{5}{10},\frac{5}{10}\right)$⟩

is NuSCS, Nu-bCS, but not an Nu-G*CS in Nu^*_X.

Example 3.13: Let Nu^*_X = {w_1, w_2} and let Nu_τ = {0_{Nu}, $\mathcal{K}$, 1_{Nu}}is NT on Nu^*_X, where

$\mathcal{K}$ =⟨w $\left(\frac{6}{10},\frac{5}{10},\frac{2}{10}\right),\left(\frac{5}{10},\frac{5}{10},\frac{4}{10}\right)$ ⟩. Then NS W^*_1=⟨w, $\left(\frac{1}{10},\frac{5}{10},\frac{7}{10}\right),\left(\frac{4}{10},\frac{5}{10},\frac{5}{10}\right)$⟩

is Nu-PCS, Nu-αCS, but not an Nu-G*CS in Nu^*_X.

Example 3.14: Let Nu^*_X = {w_1,w_2} and let Nu_τ={0_{Nu}, $\mathcal{K}$, 1_{Nu}}is NT on Nu^*_X, where

$\mathcal{K}$ =⟨w, $\left(\frac{6}{10},\frac{5}{10},\frac{2}{10}\right),\left(\frac{5}{10},\frac{5}{10},\frac{2}{10}\right)$⟩ Then the NS W^*_1=⟨w, $\left(\frac{1}{10},\frac{5}{10},\frac{3}{10}\right),\left(\frac{4}{10},\frac{5}{10},\frac{2}{10}\right)$⟩

is Nu-G*CS but not NuSCS, Nu-bCS Nu^*_X.

Example 3.15: Let Nu^*_X = {w_1,w_2} and let Nu_τ={0_{Nu}, $\mathcal{K}$, 1_{Nu}}is NT on Nu^*_X, where

$\mathcal{K}$ =⟨w, $\left(\frac{2}{10},\frac{5}{10},\frac{6}{10}\right),\left(\frac{3}{10},\frac{5}{10},\frac{5}{10}\right)$⟩ Then the NS W^*_1=⟨w, $\left(\frac{3}{10},\frac{5}{10},\frac{1}{10}\right),\left(\frac{3}{10},\frac{5}{10},\frac{3}{10}\right)$⟩

is Nu-G*CS but not NuαCS, Nu-PCS Nu^*_X.

Theorem 3.16: The union of two Nu-G*CS's is Nu-G*CS

Proof: Let W^*_1 and W^*_2 be the two Nu-G*CS's in Nu^*_X and let $W^*_1 \cup W^*_2 \subseteq \mathcal{K}$, where $\mathcal{K}$ is a Nu-GOS in Nu^*_X. Therefore $W^*_1 \subseteq \mathcal{K}$ or $W^*_2 \subseteq \mathcal{K}$ or both contained $\mathcal{K}$. Since W^*_1 and W^*_2 are Nu-G*CS, Nu-cl(W^*_1)⊆ $\mathcal{K}$ and Nu-cl(W^*_2) ⊆ $\mathcal{K}$. Therefore Nu-cl($W^*_1 \cup W^*_2$)⊆ $\mathcal{K}$. Thus $W^*_1 \cup W^*_2$ is Nu-G*CS.

Remark 3.17: The intersection of any two Nu-G*CSs is not an Nu-G*CS in general as seen in the following example.

Example 3.18: Let Nu^*_X = {w_1, w_2} and let Nu_τ={0_{Nu}, $\mathcal{K}$, 1_{Nu}}is NT on Nu^*_X,

where $\mathcal{K}$ =⟨w, $\left(\frac{5}{10},\frac{5}{10},\frac{1}{10}\right),\left(\frac{1}{10},\frac{5}{10},\frac{8}{10}\right)$⟩.

Then NS's W^*_1 = ⟨w, $\left(\frac{2}{10},\frac{5}{10},\frac{5}{10}\right),\left(\frac{7}{10},\frac{5}{10},\frac{0}{10}\right)$⟩ W^*_2 =⟨w, $\left(\frac{6}{10},\frac{5}{10},\frac{0}{10}\right),\left(\frac{3}{10},\frac{5}{10},\frac{7}{10}\right)$⟩

are Nu-G*CS's in Nu^*_X but $W^*_1 \cap W^*_2$ is not a Nu-G*CS in Nu^*_X.

Theorem 3.19: If W^*_1 is Nu-G*CS in (Nu^*_X,Nu_τ), such that $W^*_1 \subseteq W^*_2 \subseteq$ Nu-cl(W^*_1). Then W^*_2 is also a Nu-G*CS of (Nu^*_X,Nu_τ)

Proof: Let $\mathcal{K}$ be a Nu-GOS in (Nu^*_X,Nu_τ) such that $W^*_2 \subseteq \mathcal{K}$, Since $W^*_1 \subseteq W^*_2$, $W^*_1 \subseteq \mathcal{K}$ and $\mathcal{K}$ be a Nu-GOS. Also since W^*_1 is Nu-G*CS, Nu-cl(W^*_1)⊆ $\mathcal{K}$. By hypothesis W^*_2⊆Nu-cl(W^*_1). This implies Nu-cl(W^*_2)⊆Nu-cl(Nu-cl(W^*_1))⊆ $\mathcal{K}$. Therefore Nu-cl(W^*_2)⊆ $\mathcal{K}$. Hence W^*_2 is Nu-G*CS of Nu^*_X.

Theorem 3.20: If W^*_1 is both Nu-GOS and Nu-G*CS of (Nu^*_X,Nu_τ), then W^*_1 is Nu-CS in Nu^*_X.

Proof: Let W^*_1 is Nu-GOS in Nu^*_X. Since $W^*_1 \subseteq W^*_1$, by hypothesis Nu-cl(W^*_1)⊆W^*_1. But from the Definition, W^*_1⊆Nu-cl(W^*_1). Therefore Nu-cl(W^*_1)=W^*_1. Hence W^*_1 is Nu-CS of Nu^*_X.

Theorem 3.21: Let (Nu^*_X,Nu_τ) be a NTS. Then Nu-GO(Nu^*_X)=Nu-GC(Nu^*_X) iff every NS in (Nu^*_X, Nu_τ) is Nu-G*CS in Nu^*_X.

Proof:

Necessity: Suppose that Nu-GO(Nu^*_X)=Nu-GC(Nu^*_X). Let $W^*_1 \subseteq \mathcal{K}$ and $\mathcal{K}$ is Nu-GOS in Nu^*_X. This implies Nu-cl(W^*_1)⊆Nu-cl($\mathcal{K}$). Since $\mathcal{K}$ is Nu-GOS in Nu^*_X. Since by hypothesis $\mathcal{K}$ is Nu-GCS in Nu^*_X, Nu-cl($\mathcal{K}$)⊆ $\mathcal{K}$. This implies Nu-cl(W^*_1)⊆ $\mathcal{K}$. Therefore W^*_1 is Nu-G*CS in Nu^*_X.

Sufficiency: Suppose that every NS in (Nu^*_X, Nu_τ) is Nu-G*CS in Nu^*_X. Let $\mathcal{K}$ ⊆Nu-O(Nu^*_X), then

$\mathcal{K}$ ⊆Nu-GO(Nu_X^*). Since $\mathcal{K}$ ⊆ $\mathcal{K}$ and $\mathcal{K}$ is Nu-OS in Nu_X^*, by hypothesis Nu-cl($\mathcal{K}$)⊆ $\mathcal{K}$. I.e., $\mathcal{K}$ ⊆Nu-GC(Nu_X^*). Hence Nu-GO(Nu_X^*)⊆Nu-GC(Nu_X^*).Let W_1^*⊆Nu-GC(Nu_X^*) then ${W_1^*}^C$ is an Nu-GOS in Nu_X^*. But Nu-GO(Nu_X^*)⊆Nu-GC(Nu_X^*). Therefore ${W_1^*}^C$⊆Nu-GC(Nu_X^*). I.e., W_1^*⊆Nu-GO(Nu_X^*). Hence Nu-GC(Nu_X^*)⊆Nu-GO(Nu_X^*). Thus Nu-GO(Nu_X^*)⊆Nu-GC(Nu_X^*).

Theorem 3.22: If W_1^* is Nu-OS and an Nu-G*CS in (Nu_X^*,Nu_τ) , then

W_1^* is Nu-ROS in Nu_X^*

W_1^* is Nu-RCS in Nu_X^*

Proof: (i) Let W_1^* be a Nu-OS and a Nu-G*CS in Nu_X^* .Then Nu-cl(W_1^*)⊆ W_1^* . I.e., Nu int(Nu-clW_1^*))⊆W_1^*.Since W_1^* is a Nu-OS, W_1^* is Nu-POS in Nu_X^*. Hence W_1^*⊆ Nu-int(Nu-cl(W_1^*)). Therefore W_1^*= Nu-int(Nu-cl(W_1^*)). Hence W_1^* is Nu-ROS in Nu_X^*.

(ii): Let W_1^* be a Nu-OS and an Nu-G*CS inNu_X^*. Then Nu-cl(W_1^*)⊆W_1^*. I.e., Nu-cl(Nu-int(W_1^*))⊆W_1^*. Since W_1^* is a Nu-OS, W_1^* is Nu-OS in Nu_X^*. Hence W_1^*⊆Nu-cl(Nu-int(W_1^*)). Therefore W_1^* = Nu-int(Nu-cl(W_1^*)). Hence W_1^* is Nu-RCS in Nu_X^*.

4. NEUTROSOPHIC g*-OPEN SETS

In this section we introduce Neutrosophic g*-open sets and studied some of its properties.

Definition 4.1: An NS W_1^* is said to be a Neutrosophic g*-open set (Nu-G*OS in short) in (Nu_X^*, Nu_τ) if the complement ${W_1^*}^C$ is Nu-G*CS in Nu_X^*.The family of all Nu-G*OS's of A NTS (Nu_X^*, Nu_τ) is denoted by Nu-G*O(Nu_X^*).

Theorem 4.2:A subset W_1^* of (Nu_X^*, Nu_τ) is Nu-G*OS iff W_2^*⊆Nu-int(W_1^*) whenever W_2^* is Nu-GCS in Nu_X^* and W_2^*⊆ W_1^*.

Proof: Necessity: Let W_1^* is Nu-G*OS in Nu_X^*. Let W_2^* be a Nu-GCS in Nu_X^* and W_2^*⊆ W_1^*. Then ${W_2^*}^C$ is Nu-GOS in Nu_X^* such that ${W_1^*}^C$⊆ ${W_2^*}^C$. Since ${W_1^*}^C$ is Nu-G*CS, we have Nu-cl(${W_1^*}^C$)⊆ ${W_2^*}^C$. Hence Nu-int(W_1^*))^C⊆ ${W_2^*}^C$. Therefore W_2^*⊆Nu-int(W_1^*).

Sufficiency: Let W_2^*⊆ Nu-int(W_1^*) whenever W_2^* is Nu-GCS in Nu_X^* and W_2^*⊆ W_1^*. Then ${W_1^*}^C$⊆ ${W_2^*}^C$ and ${W_2^*}^C$ is Nu-GOS. By hypothesis, (Nu-int(W_1^*))^C⊆ ${W_2^*}^C$, which implies Nu-cl(${W_1^*}^C$)⊆ ${W_2^*}^C$. Therefore ${W_1^*}^C$ is Nu-G*CS of Nu_X^*. Hence W_1^* is Nu-G*OS in Nu_X^*.

Theorem 4.3: Every Nu-OS is Nu-G*OS .

Proof: Let W_1^* be a Nu-OS. Then ${W_1^*}^C$ is Nu-CS. By Theorem 3.3, every Nu-CS is Nu-G*CS. Therefore ${W_1^*}^C$ is Nu-G*CS. Hence W_1^* is Nu-G*OS.

Example 4.4: Let Nu_X^* = {w_1, w_2} and let Nu_τ={0_{Nu}, $\mathcal{K}$, 1_{Nu}}is NT on Nu_X^*, where

$\mathcal{K}$ =⟨w, $\left(\frac{2}{10},\frac{5}{10},\frac{2}{10}\right)$, $\left(\frac{5}{10},\frac{5}{10},\frac{8}{10}\right)$⟩. Then NS W_1^* =⟨ w, $\left(\frac{2}{10},\frac{5}{10},\frac{3}{10}\right)$, $\left(\frac{7}{10},\frac{5}{10},\frac{8}{10}\right)$⟩

is Nu-G*OS but not an Nu-OS in Nu_X^*.

Theorem 4.5: Every Nu-ROS is Nu- G*OS .

Proof: Let W_1^* be aNu-WS. Then ${W_1^*}^C$ is Nu-RCS. By Theorem 3.15, every Nu-RCS is Nu-G*CS. Therefore ${W_1^*}^C$ is Nu-G*CS. Hence W_1^* is Nu-G*OS.

Example 4.6: Let Nu_X^* = {w_1, w_2} and let Nu_τ={0_{Nu}, $\mathcal{K}$, 1_{Nu}}is NT on Nu_X^*, where

$\mathcal{K}$ =⟨w, $\left(\frac{3}{10},\frac{5}{10},\frac{6}{10}\right)$, $\left(\frac{7}{10},\frac{5}{10},\frac{3}{10}\right)$⟩ Then NS W_1^*=⟨w, $\left(\frac{3}{10},\frac{5}{10},\frac{7}{10}\right)$, $\left(\frac{4}{10},\frac{5}{10},\frac{6}{10}\right)$⟩is Nu-G*OS but not an Nu-ROS in Nu_X^*.

Theorem 4.7: Every Nu-G*OS is Nu-GOS .

Proof: Let W_1^* be a Nu-G*OS in (Nu_X^*, Nu_τ) . Then ${W_1^*}^C$ is Nu-G*CS. By Theorem 3.6, every Nu-G*CS is Nu-GCS. Therefore ${W_1^*}^C$ is Nu-GCS. Hence W_1^* is Nu-GOS.

Example 4.8: Let Nu_X^* ={w_1,w_2} and let Nu_τ ={0_{Nu}, $\mathcal{K}$, 1_{Nu}}is NT on Nu_X^*, where

$\mathcal{K}$ =⟨w, $\left(\frac{5}{10},\frac{5}{10},\frac{4}{10}\right)$, $\left(\frac{2}{10},\frac{5}{10},\frac{2}{10}\right)$⟩. Then NS W_1^* =⟨w, $\left(\frac{4}{10},\frac{5}{10},\frac{6}{10}\right)$, $\left(\frac{2}{10},\frac{5}{10},\frac{6}{10}\right)$⟩is Nu-GOS but not an Nu-G*OS inNu_X^*.

Theorem 4.9: Every Nu-G*OS is Nu-αGOS .

Proof: Let W_1^* be aNu-G*OS in (Nu_X^*,Nu_τ). Then ${W_1^*}^C$ is Nu-G*CS. By Theorem 3.9, every Nu-G*CS is Nu-αGCS. Therefore ${W_1^*}^C$ is Nu-αGCS. Hence W_1^* is Nu-αGOS.

Example 4.10: Let Nu_X^* ={ w_1 , w_2 } and let Nu_τ ={0_{Nu}, $\mathcal{K}$,1_{Nu}}is NT on Nu_X^*, where $\mathcal{K}$ = ⟨w, $\left(\frac{4}{10},\frac{5}{10},\frac{2}{10}\right)$, $\left(\frac{6}{10},\frac{5}{10},\frac{7}{10}\right)$⟩Then the NS W_1^*=⟨w, $\left(\frac{6}{10},\frac{5}{10},\frac{4}{10}\right)$, $\left(\frac{5}{10},\frac{5}{10},\frac{3}{10}\right)$⟩ is Nu-$\alpha$GOS but not an Nu-G*OS in Nu_X^*.

Theorem 4.11: The intersection of two Nu-G*OS's is Nu-G*OS.

Proof: Let W_1^* and W_2^* be the two Nu-G*OS's inNu_X^*, ${W_1^*}^C$ and ${W_2^*}^C$ are Nu-G*CS. By Theorem 3.28 ${W_1^*}^C$∪${W_2^*}^C$ is Nu-G*CS in Nu_X^*. Therefore (W_1^*∩W_2^*) is Nu-G*CS. Thus W_1^*∩W_2^* is Nu-G*OS in Nu_X^*.

Theorem 4.12: Let (Nu_X^*, Nu_τ) be a NTS. If W_1^* is NS of Nu_X^*. Then for every W_1^* ∈ Nu-G*O(Nu_X^*) and every W_2^* ∈(Nu_X^*), Nu-int(W_1^*)⊆W_2^* ⊆ W_1^* implies W_2^* ∈ Nu-G*O(Nu_X^*).

Proof: By hypothesis Nu-int(W_1^*)⊆W_2^* ⊆ W_1^*. Taking complement on both sides, we get ${W_1^*}^C$ ⊆ ${W_2^*}^C$⊆Nu-cl(${W_1^*}^C$). Let ${W_2^*}^C$⊆ $\mathcal{K}$ and $\mathcal{K}$ is Nu-GOS in Nu_X^*. Since${W_1^*}^C$ ⊆ ${W_2^*}^C$, ${W_1^*}^C$⊆ $\mathcal{K}$. Since ${W_1^*}^C$ is Nu-G*CS, Nu-cl(${W_1^*}^C$)⊆ $\mathcal{K}$. Therefore Nu-cl(${W_2^*}^C$)⊆Nu-cl(${W_1^*}^C$)⊆ $\mathcal{K}$. Hence ${W_2^*}^C$ is Nu-G*CS in Nu_X^*. Therefore W_2^* is Nu-G*OS in Nu_X^*. I.e., W_2^* ⊆Nu-G*O(Nu_X^*)

Definition: 4.13: For any Nu. set W_1^* in any NSTS,

Nu-g*cl(W_1^*) =∩{ $\mathcal{U}$: $\mathcal{U}$ is Nu-g*CS Nu. set and W_1^*⊆ $\mathcal{U}$ }

Nu-g*int (W_1^*) = ∪{ : $\mathcal{V}$ is Nu-g* OS and W_1^* ⊇ $\mathcal{V}$ }

Theorem: 4.14: In a Its (Nu_X^*, Nu_τ) a Nu. set W_1^* is Nu-g*- CS iff W_1^* = Nu-g* cl(W_1^*).

Proof: Let W_1^* be a Nu-g*CS Nu. set in NSTS (Nu_X^*, Nu_τ). Since W_1^* ⊆ W_1^* and W_1^* is Nu-g*CS , W_1^* ∈{ $\mathcal{K}$: $\mathcal{K}$ is a Nu-g*CS Nu. set and W_1^*⊆ $\mathcal{K}$ } and W_1^*⊆ $\mathcal{K}$ ⇒ W_1^* = ∩{ $\mathcal{K}$: $\mathcal{K}$ is Nu-g*CS and W_1^*⊆ $\mathcal{K}$ } that is W_1^* = Nu-g* cl(W_1^*).

Conversely, suppose that W_1^* = Nu-g*cl(W_1^*),that is W_1^*= ∩{ $\mathcal{K}$: $\mathcal{K}$ is a Nu-g*- CS Nu. set and W_1^*⊆ $\mathcal{K}$ }. This denotes that W_1^* ∈{ $\mathcal{K}$: $\mathcal{K}$ is a Nu-g*CS Nu. set and W_1^*⊆ $\mathcal{K}$ }. From now W_1^* is Nu-g*CS Nu. set.

Theorem: 4.15 In a NSTS Nu_X^* the subsequent results hold for Nu-g* - closure.

1) Nu-g*cl (0_{Nu}) = 0_{Nu}.

2) Nu-g*cl (W_1^*) is Nu-g*CS Nu. set in Nu_X^*.

3) Nu-g*cl (W_1^*) ⊆Nu-g*cl (W_2^*) if W_1^*⊆W_2^*.

4) Nu-g* cl (Nu-g*cl(W_1^*)) = Nu-g* cl(W_1^*).

5) Nu-g* cl (W_1^* ∪ W_2^*)⊇Nu-g* cl(W_1^*)∪Nu-g* cl(W_2^*).

6) Nu-g* cl (W_1^* ∩ W_2^*)⊆Nu-g* cl(W_1^*)∩Nu-g* cl(W_2^*).

Proof: easy

Theorem: 4.16 In a NSTS Nu_X^*, a Nu. set W_1^* is Nu-g* OS iff W_1^* = Nu-g*int (W_1^*).

Proof: Let W_1^* be Nu-g*OS Nu. set in Nu_X^*. Since W_1^* ⊆ W_1^* and W_1^* is Nu-g* OS and W_1^* ∈{ $\mathcal{K}$: $\mathcal{K}$ is a Nu-g* OS Nu. set and W_1^* ⊇ $\mathcal{K}$ } and W_1^* ⊇ $\mathcal{K}$ ⇒ W_1^* = ∪{ $\mathcal{K}$: $\mathcal{K}$ is Nu-g*OS and W_1^* ⊇ $\mathcal{K}$ }. That is W_1^*=Nu-g*int (W_1^*).

Conversely, suppose that W_1^* = Nu-g*int (W_1^*), that is W_1^*=∪($\mathcal{K}$: $\mathcal{K}$ is Nu-g*OS and $W_1^* \supseteq \mathcal{K}$ }. This implies that W_1^* ∈{ $\mathcal{K}$: $\mathcal{K}$ is Nu-g*OS and $W_1^* \supseteq \mathcal{K}$ }.Hence W_1^* is Nu-g*OS Nu. set.

Theorem: 4.17 In a NSTS Nu_X^*, the following hold for Nu-g* -interior.

1) Nu-g*int (0_{Nu}) = 0_{Nu}

2) Nu-g*int(W_1^*) ⊆Nu-g*int (W_2^*) if $W_1^* \subseteq W_2^*$.

3) Nu-g*int (W_1^*) is Nu-g*OS in Nu_X^*.

4) Nu-g*int (Nu-g*int (W_1^*)) = Nu-g*int (W_1^*).

5) Nu-g*int ($W_1^* \cup W_2^*$)⊇Nu-g*int(W_1^*)∪Nu-g*int (W_2^*).

6) Nu-g*int ($W_1^* \cap W_2^*$)⊆Nu-g*int(W_1^*)∩Nu-g*int (W_2^*).

Proof: proof is as usual.

5. NEUTROSOPHIC g*- CONTINUOUS

In this section we introduce Neutrosophic g*-continuous and studied some properties of neutrosophic g* - open map and closed map.

Definition:5.1 Let Nu_X^* and Nu_Y^* be two NTS. A function $f: Nu_X^* \longrightarrow Nu_Y^*$ is said to be neutrosophic g* - continuous (Nu-g* - continuous) if the inverse image of every neutrosophic open set in Nu_Y^* is g* - open in Nu_X^*.

Theorem:5.2 A function $f: Nu_X^* \longrightarrow Nu_Y^*$ is Nu-g* - continuous iff the inverse image of every Nu-closed set in Nu_Y^* is g* - closed set in Nu_X^*.

Proof: Suppose the function $f: Nu_X^* \longrightarrow Nu_Y^*$is Nu-g* - continuous. Let $\mathcal{F}$ be Nu-closed set in Nu_Y^*. Then $\mathcal{F}^c$ is Nu- open set in Nu_Y^*. Since f is Nu-g* - continuous, $f^{-1}(\mathcal{F}^c)$ is Nu- g* - open in Nu_X^*. But $f^{-1}(\mathcal{F}^c)$= $(f^{-1}(\mathcal{F}^c))^c$and so $f^{-1}(\mathcal{F})$is Nu-g* - closed in Nu_X^*.

Conversely, assume that the inverse image of every Nu-closed set in Nu_Y^* is Nu-g* - closed in Nu_X^*. Let $\mathcal{V}$ be neutrosophic open set in Nu_Y^*. Then$\mathcal{V}^c$is Nu-closed in Nu_Y^*. By hypothesis, $f^{-1}(\mathcal{V}^c)$ is Nu-g*-closed set in Nu_X^*. But $f^{-1}(\mathcal{V}^c)$ = $(f^{-1}(\mathcal{V}^c))^c$ and so $f^{-1}(\mathcal{V})$is Nu-g* - open set in Nu_X^*. Hence f is Nu-g*-continuous.

Theorem:5.3 Every Nu- continuous function is Nu-g* - continuous.

Proof: Let $f: Nu_X^* \longrightarrow Nu_Y^*$be Nu-continuous. Let $\mathcal{F}$ be Nu-closed set in Nu_Y^*. Then $f^{-1}(\mathcal{F})$ is Nu-closed set in Nu_X^* since f is neutrosophic continuous. And therefore $f^{-1}(\mathcal{F})$is Nu-g* - closed in Nu_X^*. Hence f is Nu-g* - continuous.

Theorem:5.4 Every Nu-g*-continuous function isNu-g-continuous.

Proof: Let $f: Nu_X^* \longrightarrow Nu_Y^*$ be Nu-g* - continuous. Let $\mathcal{F}$ be a Nu-closed set inNu_Y^*. Since f is Nu-g* - continuous, $f^{-1}(\mathcal{F})$ is Nu-g* - closed in Nu_X^*. And therefore $f^{-1}(\mathcal{F})$ is Nu-g - closed in Nu_X^* as every Nu-g*-closed set is Nu-g - closed. Hence f is Nu-g- continuous.

The converse of the above theorem need not be true as seen from the following example.

Theorem:5.5 If $f: Nu_X^* \longrightarrow Nu_Y^*$is Nu-g* - continuous and Nu_X^* is neutrosophic –$T^*_{1/2}$ NTS. Then f is neutrosophic -continuous.

Proof: Let $f: Nu_X^* \longrightarrow Nu_Y^*$be Nu-g*- continuous . Let $\mathcal{F}$ be Nu-closed set in Nu_Y^*. Then $f^{-1}(\mathcal{F})$is $f^{-1}(\mathcal{F})$ Nu- g* - closed in Nu_X^* since f is Nu-g* - continuous. Also since Nu_X^* is neutrosophic - $T^*_{1/2}$, $f^{-1}(\mathcal{F})$is closccl in Nu_X^*. Hence f is Nu-continuous.

Theorem:5.6 If $f: Nu_X^* \longrightarrow Nu_Y^*$is Nu-g - continuous and Nu_X^* is neutrosophic - $T^*_{1/2}$ NTS. Then f is Nu-g* - continuous.

Proof: Let $f: Nu_X^* \longrightarrow Nu_Y^*$ be Nu-g - continuous. Let $\mathcal{F}$ be Nu-closed set in Nu_Y^*, then $f^{-1}(\mathcal{F})$ is g-closed in Nu_X^*. Since X is neutrosophic - $T^*_{1/2}$, $f^{-1}(\mathcal{F})$is Nu- g* - closed in Nu_X^*. Hence f is Nu-g* -

continuous.

Theorem:5.7 If $f: Nu^*_X \longrightarrow Nu^*_Y$is Nu-g* - continuous and g : $Nu^*_Y \longrightarrow Nu^*_Z$ is Nu-continuous then gof : $Nu^*_X \longrightarrow Nu^*_Z$ is Nu-g * - continuous.

Proof: Let $\mathcal{F}$ be Nu-closed set in Nu^*_Z. Then $g^{-1}(\mathcal{F})$ is closed in Nu^*_Y since g is Nu-continuous. And then $f^{-1}(g^{-1}(\mathcal{F}))$ is Nu-g* - closed in Nu^*_X since f is Nu-g* - continuous.

Now $(g \circ f)^{-1}(\mathcal{F}) = f^{-1}(g^{-1}(\mathcal{F}))$ is Nu- g* - closed in Nu^*_X. Hence $g \circ f$: $Nu^*_X \longrightarrow Nu^*_Z$ is Nu-g*-continuous.

Theorem:5.8 If $f: Nu^*_X \longrightarrow Nu^*_Y$is Nu-g* - continuous and g : $Nu^*_Y \longrightarrow Nu^*_Z$ is Nu-g* - continuous and Nu^*_Y is neutrosophic –$T^*_{1/2}$ space. Then gof : $Nu^*_X \longrightarrow Nu^*_Z$ is Nu-g*- continuous.

Proof: Let $\mathcal{F}$ be Nu-closed set in Nu^*_Z. Then $g^{-1}(\mathcal{F})$ is Nu-g*CS in Nu^*_Y since g is Nu-g*-continuous. Since Nu^*_Y is neutrosophic –$T^*_{1/2}$, $g^{-1}(\mathcal{F})$ is Nu-closed in Nu^*_Y. And then $f^{-1}(g^{-1}(\mathcal{F}))$ is Nu-g*CS in Nu^*_X as f is Nu-g* - continuous. Now $(g \circ f)^{-1}(\mathcal{F}) = f^{-1}(g^{-1}(\mathcal{F}))$is Nu-g*CS in Nu^*_X. Hence $g \circ f$ is Nu-g* - continuous.

Definition:5.9A map $f: Nu^*_X \longrightarrow Nu^*_Y$ is said to be neutrosophic g* - open if the image of every neutrosophic open set in Nu^*_X is Nu-g*-open set in Nu^*_Y.

Definition:5.10 A map $f: Nu^*_X \longrightarrow Nu^*_Y$is said to be neutrosophic g* - closed if the image of every Nu-closed set in Nu^*_X is Nu-g*-closed set in Nu^*_Y.

Theorem: 5.11 Every neutrosophic open map is neutrosophic g* - open.

Proof: Let $f: Nu^*_X \longrightarrow Nu^*_Y$ be a neutrosophic open map let $\mathcal{V}$ be an neutrosophic open set in Nu^*_X then f $(\mathcal{V})$ is Nu-open in Nu^*_Y since f is neutrosophic open map. And therefore $f(\mathcal{V})$ is Nu-g* - open in Nu^*_Y. Hence f is neutrosophic g* open map.

Theorem :5.12 If $f: Nu^*_X \longrightarrow Nu^*_Y$is Nu-g*-open map and Nu^*_Y is neutrosophic –$T^*_{1/2}$, then f is a Nu-open map.

Proof : Let $f: Nu^*_X \longrightarrow Nu^*_Y$is neutrosophic g*- open map. Let $\mathcal{V}$ be neutrosophic open set in Nu^*_X. Then f $(\mathcal{V})$ is Nu- g* - open in Nu^*_Y. Since Nu^*_Y is neutrosophic -$T^*_{1/2}$, $f(\mathcal{V})$ is neutrosophic open set in Nu^*_Y. Hence f is Nu- open map.

Theorem:5.13 Every Nu-g* - open map is neutrosophic g - open.

Proof: Let $f: Nu^*_X \longrightarrow Nu^*_Y$ be a Nu-g*- open map. Let $\mathcal{V}$ be neutrosophic open set in Nu^*_X. Then f $(\mathcal{V})$ is Nu-g* - open in Nu^*_Y since f is Nu-g* - open map. And therefore $f(\mathcal{V})$ is Nu-g- open set in Nu^*_Y. Hence f is neutrosophic g - open map.

Theorem : 5.14 If $f: Nu^*_X \longrightarrow Nu^*_Y$is neutrosophic g - open and Nu^*_Y is neutrosophic - $^*T_{1/2}$ space, then f in Nu-g* - open map.

Proof: Let $\mathcal{V}$ be neutrosophic open set in Nu^*_X. Then $f(\mathcal{V})$ is Nu-g - open in Nu^*_Y. Since Nu^*_Y is neutrosophic -$^*T_{1/2,}$ f $(\mathcal{V})$ is Nu-g* - open in Nu^*_Y. And hence f is Nu-g* - open map.

Theorem : 5.15 Every Nu-closed map is Nu-g* - closed map.

Proof: Let $f: Nu^*_X \longrightarrow Nu^*_Y$ be Nu-closed map. Let $\mathcal{F}$ be Nu-closed set in Nu^*_X.Then $f(\mathcal{F})$ is closed in Nu^*_Y. And therefore $f(\mathcal{F})$ is Nu- g* - closed in Nu^*_Y. And hence f is Nu-g* - closed map.

Theorem :5.16 If $f: Nu^*_X \longrightarrow Nu^*_Y$is Nu-g* - closed and Nu^*_Y is neutrosophic -$T^*_{1/2}$. Then f is Nu-closed map.

Proof: Let $f: Nu^*_X \longrightarrow Nu^*_Y$ be Nu-g* - closed map. Let $\mathcal{F}$ be Nu-closed set in Nu^*_X.Then f^{-1} $(\mathcal{F})$ is Nu- g* - closed in Nu^*_Y. Since Nu^*_Y is neutrosophic -$T^*_{1/2}$, $f(\mathcal{F})$ is Nu-closed in Nu^*_Y. Hence f is neutrosophic closcd map.

Theorem: 5.17 A map $f: Nu^*_X \longrightarrow Nu^*_Y$is Nu-g* - closed iff for each neutrosophic set $\mathcal{S}$ of $Nu^*_Y$and for each neutrosophic open set $\mathcal{U}$ such that $f^{-1}(\mathcal{S})\subseteq \mathcal{U}$ there is a Nu-g*-open set $\mathcal{V}$ of $\mathrm{Nu}^*_{\mathrm{Y}}$ such that $\mathcal{S} \subseteq \mathcal{V}$ and $f^{-1}(\mathcal{V}) \subseteq \mathcal{U}$.

Proof: Suppose f is Nu-g* - closed map. Let $\mathcal{S}$ be a neutrosophic set of $\mathrm{Nu}^*_{\mathrm{Y}}$ and $\mathcal{U}$ be a neutrosophic open set of $\mathrm{Nu}^*_{\mathrm{X}}$ such that $f^{-1}(\mathcal{U})\subseteq \mathcal{U}$. Then $\mathcal{V}$ = $\mathrm{Nu}^*_{\mathrm{Y}} - f\ (\mathcal{U}^C)$ is a Nu-g*-open set in $\mathrm{Nu}^*_{\mathrm{Y}}$ such that $\mathcal{S} \subseteq \mathcal{V}$ and $f^{-1}(\mathcal{V})\subseteq \mathcal{U}$.

Conversely, suppose that $\mathcal{F}$ is a Nu-closed set of $\mathrm{Nu}^*_{\mathrm{X}}$. Then $f^{-1}\ (f(\mathcal{F}^C))\subseteq \mathcal{F}^C$and $\mathcal{F}^C$is Nu-open. By hypothesis, there is a Nu-g*-open set $\mathcal{V}$ of $\mathrm{Nu}^*_{\mathrm{Y}}$ such that $f(\mathcal{F})^c\subseteq \mathcal{V}$ and $f^{-1}(\mathcal{V})\subseteq \mathcal{F}^C$ Therefore $\mathcal{F} \subseteq f^{-1}(\mathcal{V})^C$. Hence $\mathcal{V}^c\subseteq f(\mathcal{F})\subseteq f(f^{-1}(\mathcal{V})^c)\subseteq \mathcal{V}^c$ which implies $f(\mathcal{F}) = \mathcal{V}^c$. Since $\mathcal{V}^c$is Nu-g* - closed, $f(\mathcal{F})$ is Nu-g*CS and thus f is a Nu-g*- closed m ap.

Conclusion

In this paper, we have defined the neutrosophic g* closed sets and open sets.then discussed about neutrosophic g* continuity Then,we have presented some properties of these operations. We have also investigated neutrosophic topological structures of neutrosophic sets. Hence, we hope that the findings in this paper will help researchers enhance and promote the further study on neutrosophic topology.

Funding: This research received no external funding.

Acknowledgments: The authors are highly grateful to the Referees for their constructive suggestions.

Conflicts of Interest: The authors declare no conflict of interest

References

[1] Abdel-Basset, M., Mohamed, R., Elhoseny, M., & Chang, V. (2020). Evaluation framework for smart disaster response systems in uncertainty environment. Mechanical Systems and Signal Processing, 145, 106941.

[2] Abdel-Basset, M., Ali, M., & Atef, A. (2020). Uncertainty assessments of linear time-cost tradeoffs using neutrosophic set. Computers & Industrial Engineering, 141, 106286.\

[3] Abdel-Basset, M., Ali, M., & Atef, A. (2020). Resource levelling problem in construction projects under neutrosophic environment. The Journal of Supercomputing, 76(2), 964-988.

[4] Abdel-Basset, M., Gamal, A., Son, L. H., & Smarandache, F. (2020). A Bipolar Neutrosophic Multi Criteria Decision Making Framework for Professional Selection. Applied Sciences, 10(4), 1202.

[5] K. Atanassov , Intuitionistic fuzzy sets, Fuzzy Sets and Systems 20(1986),87-94.

[6] I.Arokiarani, R. Dhavaseelan, S. Jafari, M. Parimala,On Some New Notions and Functions In Neutrosophic Topological Spaces,Neutrosophic Sets and Systems, Vol. 16, 2017,(16-19)

[7] V.Banu priya, S.Chandrasekar, Neutrosophic α generalized semi closed set, Neutrosophic Sets and Systems, Vol. 28, 2019,162-170.

[8] R .Dhavaseelan and S.Jafari, Generalized Neutrosophic closed sets, New trends in Neutrosophic theory and applications Volume II- 261-273,(2018).

[9] R. Dhavaseelan, S. Jafari and md. Hanif page, Neutrosophic generalized α-contra-continuity, creat. math. inform. 27 (2018), no. 2, 133 – 139

[10] Florentin Smarandache ,Neutrosophic and NeutrosophicLogic,First International Confer On

Neutrosophic Logic, Set, Probability, and Statistics University of New Mexico, Gallup, NM 87301, USA (2002), smarand@unm.edu

[11] Floretin Smaradache, Neutrosophic Set: - A Generalization of Intuitionistic Fuzzy set,Journal of Defense resourses Management. 1(2010), 107-114.

[12] Ishwarya, P and Bageerathi, K., On Neutrosophic semi open sets in Neutrosophic topological spaces, International Jour. of Math. Trends and Tech. 2016, 214-223.

[13] D.Jayanthi, α Generalized Closed Sets in Neutrosophic Topological Spaces, International Journal of Mathematics Trends and Technology (IJMTT)- Special Issue ICRMIT March 2018.

[14] Maheswari, C., Sathyabama, M., Chandrasekar, S., Neutrosophic generalized b-closed Sets Neutrosophic Topological Spaces,Journal of physics Conf. Series, 1139 (2018) 012065.

[15] C.Maheswari , S. Chandrasekar , Neutrosophic gb-closed Sets and Neutrosophic gb-Continuity, Neutrosophic Sets and Systems, Vol. 29, 2019,89-99

[16] T Rajesh kannan , S.Chandrasekar,Neutosophic $\omega\alpha$-closed sets in Neutrosophic topological space, Journal Of Computer And Mathematical Sciences,vol.9(10),1400-1408 Octobe2018.

[17] T Rajesh kannan ,S.Chandrasekar,Neutosophic α-continuous multifunction in Neutrosophic topological space, The International Journal of Analytical and Experimental Modal Analysis, Volume XI,IssueIX,September 2019,1360-9367

[18] T.RajeshKannan, and S.Chandrasekar, Neutrosophic α-Irresolute Multifunction In Neutrosophic Topological Spaces, " Neutrosophic Sets and Systems 32, 1 (2020),390-400. https://digitalrepository.unm.edu/ nss_journal/vol32/iss1/25

[19] A.A. Salama and S.A. Alblowi, Generalized Neutrosophic Set and Generalized Neutrosophic Topological Spaces, Journal computer Sci. Engineering, Vol.(ii) No.(7)(2012).

[20] A.A.Salama and S.A.Alblowi, Neutrosophic set and Neutrosophic topological space, ISOR J.mathematics, Vol.(iii) ,Issue(4),(2012).pp-31-35.

[21] V.K.Shanthi ,S.Chandrasekar, K.SafinaBegam, Neutrosophic Generalized Semi Closed Sets In Neutrosophic Topological Spaces, International Journal of Research in Advent Technology, Vol.6, No.7, July 2018, 1739-1743

[22] V. Venkateswara Rao,Y. Srinivasa Rao, Neutrosophic Pre-open Sets and Pre-closed Sets in Neutrosophic Topology, International Journal of ChemTech Research, Vol.10 , pp 449- 458, 2017

[23] Fatimah M. Mohammed and Sarah W. Raheem, Generalized b Closed Sets and Generalized b Open Sets in Fuzzy Neutrosophic bi-Topological Spaces, Neutrosophic Sets and Systems, vol. 35, 2020, pp. 188-197. DOI: 10.5281/zenodo.3951661

[24] R. Suresh and S. Palaniammal, Neutrosophic Weakly Generalized open and Closed Sets Neutrosophic Sets and Systems, vol. 33, 2020, pp. 67-77. DOI: 10.5281/zenodo.3782855

[25] G.Jayaparthasarathy, M.Arockia Dasan, V.F.Little Flower and R.Ribin Christal, New Open Sets in N-Neutrosophic Supra Topological Spaces, Neutrosophic Sets and Systems, vol. 31, 2020, pp. 44-62. DOI: 10.5281/zenodo.3638252

[26] R. Vijayalakshmi, A. Savitha Mary and S. Anjalmose: Neutrosophic Semi-Baire Spaces, Neutrosophic Sets and Systems, vol. 30, 2019, pp. 132-142. DOI: 10.5281/zenodo.3569673

[27] I. Mohammed Ali Jaffer and K. Ramesh: Neutrosophic Generalized Pre Regular Closed Sets, Neutrosophic Sets and Systems, vol. 30, 2019, pp. 171-181. DOI: 10.5281/zenodo.3569681

[28] T. Nandhini, M. Vigneshwaran:pen map, αg#ψclosed map and Nαg#ψ-homomorphism in neutrosophic topological spaces, Neutrosophic Sets and Systems, vol. 29, 2019, pp. 186-196, DOI: 10.5281/zenodo.3514429

[29] Anitha S, Mohana K, F. Smarandache: On NGSR Closed Sets in Neutrosophic Topological Spaces, Neutrosophic Sets and Systems, vol. 28, 2019, pp. 171-178. DOI: 10.5281/zenodo.3382534

[30] R. Narmada Devi, R. Dhavaseelan and S. Jafari: A Novel on NSR Contra Strong Precontinuity, Neutrosophic Sets and Systems, vol. 27, 2019, pp. 70-79. DOI: 10.5281/zenodo.3275708

Received: May 4, 2020. Accepted: September 23, 2020