On Totally $\mathcal{N}g^#$ – Continuous Functions in Neutrosophic Topological Space

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Abstract:
In this article, we introduce a new concept of Neutrosophic continuous functions called totally $\mathcal{N}g^#$ – continuous functions and study their properties in Neutrosophic topological spaces.

Key Word: $\mathcal{N}g^#$ – closed set, $\mathcal{N}g^#$ – continuous function, totally $\mathcal{N}g^#$ – continuous function.

I. Introduction

Smarandache [4] introduced the idea of Neutrosophic set, and in 2014 Salama et.al. [12] initiated further studies into Neutrosophic closed sets and Neutrosophic continuous functions. Recently Pious Missier et.al.[7],[8], introduced the concept of $\mathcal{N}g^#$ – closed sets, continuous and irresolute mappings, in Neutrosophic Topological Spaces. In this paper, we introduce a new type of continuity in the concept of Neutrosophic topology called totally $\mathcal{N}g^#$ – continuous functions and investigate their properties with necessary examples.

II. Preliminaries

Definition 2.1 [4] A Neutrosophic set $(\mathcal{N}s)\mathcal{A}_x$ is an object having the form

$\mathcal{A}_x = \{ (\mu_{\mathcal{A}_x}(x), \sigma_{\mathcal{A}_x}(x), \gamma_{\mathcal{A}_x}(x)) : x \in X \}$

where $\mu_{\mathcal{A}_x}(x)$, $\sigma_{\mathcal{A}_x}(x)$ and $\gamma_{\mathcal{A}_x}(x)$ represent the degree of membership, degree of indeterminacy and the degree of non-membership respectively of each element $x \in X$ to the set $\mathcal{A}_x$. A Neutrosophic set $\mathcal{A}_x = \{ (x, \mu_{\mathcal{A}_x}(x), \sigma_{\mathcal{A}_x}(x), \gamma_{\mathcal{A}_x}(x)) : x \in X \}$ can be identified as an ordered triple $(\mu_{\mathcal{A}_x}(x), \sigma_{\mathcal{A}_x}(x), \gamma_{\mathcal{A}_x}(x))$ in $]-1,1+[on X$.

Definition 2.2 [12] For any two Neutrosophic sets $\mathcal{A}_x = \{ (x, \mu_{\mathcal{A}_x}(x), \sigma_{\mathcal{A}_x}(x), \gamma_{\mathcal{A}_x}(x)) : x \in X \}$ and $\mathcal{B}_x = \{ (x, \mu_{\mathcal{B}_x}(x), \sigma_{\mathcal{B}_x}(x), \gamma_{\mathcal{B}_x}(x)) : x \in X \}$ we have

- $\mathcal{A}_x \subseteq \mathcal{B}_x \iff \mu_{\mathcal{A}_x}(x) \leq \mu_{\mathcal{B}_x}(x), \sigma_{\mathcal{A}_x}(x) \leq \sigma_{\mathcal{B}_x}(x) \text{ and } \gamma_{\mathcal{A}_x}(x) \geq \gamma_{\mathcal{B}_x}(x)$.
- $\mathcal{A}_x \cap \mathcal{B}_x = \{ (x, \mu_{\mathcal{A}_x}(x) \wedge \mu_{\mathcal{B}_x}(x), \sigma_{\mathcal{A}_x}(x) \wedge \sigma_{\mathcal{B}_x}(x), \gamma_{\mathcal{A}_x}(x) \vee \gamma_{\mathcal{B}_x}(x)) \}$
- $\mathcal{A}_x \cup \mathcal{B}_x = \{ (x, \mu_{\mathcal{A}_x}(x) \vee \mu_{\mathcal{B}_x}(x), \sigma_{\mathcal{A}_x}(x) \vee \sigma_{\mathcal{B}_x}(x), \gamma_{\mathcal{A}_x}(x) \wedge \gamma_{\mathcal{B}_x}(x)) \}$

Definition 2.3 [12] Let $\mathcal{A}_x = (\mu_{\mathcal{A}_x}(x), \sigma_{\mathcal{A}_x}(x), \gamma_{\mathcal{A}_x}(x))$ be a $\mathcal{N}s$ on $X$, then the complement $\mathcal{A}_x^c$ defined as

- $\mathcal{A}_x^c = \{ (x, \gamma_{\mathcal{A}_x}(x), 1 - \sigma_{\mathcal{A}_x}(x), \mu_{\mathcal{A}_x}(x)) : x \in X \}$

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Note that for any two Neutrosophic sets $\mathcal{A}_N$ and $\mathcal{B}_N$,

- $(\mathcal{A}_N \cup \mathcal{B}_N)^c = \mathcal{A}_N^c \cap \mathcal{B}_N^c$
- $(\mathcal{A}_N \cap \mathcal{B}_N)^c = \mathcal{A}_N^c \cup \mathcal{B}_N^c$.

**Definition 2.4** [12] A Neutrosophic topology $(\mathcal{N})$ on a non-empty set $X$ is a family $\tau$ of Neutrosophic subsets in $X$ satisfies the following axioms:

1. $\emptyset, 1_X \in \tau$
2. $R_{N_1} \cap R_{N_2} \in \tau$ for any $R_{N_1}, R_{N_2} \in \tau$
3. $\cup R_{N_i} \in \tau \forall R_{N_i} \subseteq I \subseteq \tau$

Here the empty set $\emptyset_N$ and the whole set $1_N$ may be defined as follows:

1. $\emptyset_N = \{(x, 0, 0, 1) : x \in X\}$
2. $1_N = \{(x, 1, 1, 0) : x \in X\}$

**Definition 2.5** [12] Let $\mathcal{A}_N$ be a $N'S$ in $\mathcal{N}TSX_N$. Then

1. $\mathcal{N}$int$(\mathcal{A}_N) = \{G : G$ is a $N'OSS$ in $X_N$ and $G \subseteq \mathcal{A}_N\}$ is called a Neutrosophic interior of $\mathcal{A}_N$.
2. $\mathcal{N}$cl$(\mathcal{A}_N) = \{K : K$ is a $N'CS$ in $X_N$ and $\mathcal{A}_N \subseteq K\}$ is called Neutrosophic closure of $\mathcal{A}_N$.

**Definition 2.6** [5] A Neutrosophic set $\mathcal{A}_N$ of a $N'TS (X, \tau)$ is called a neutrosophic $NagCS$ if $\mathcal{N}$agcl$(\mathcal{A}_N) \subseteq \mathcal{U}_N$, whenever $\mathcal{A}_N \subseteq \mathcal{U}_N$ and $\mathcal{U}_N$ is a $N'OS$ in $X$. The complement of $NagCS$ is $NagOS$.

**Definition 2.7** [7] A Neutrosophic set $\mathcal{A}_N$ of a $N'TS (X, \tau)$ is called a Neutrosophic $g^*$-closed $(Nag^*CS)$ if $\mathcal{N}$agcl$(\mathcal{A}_N) \subseteq \mathcal{Q}_N$ whenever $\mathcal{A}_N \subseteq \mathcal{Q}_N$ and $\mathcal{Q}_N$ is $NagOS$ in $X$. The complement of $Nag^*CS$ is $Nag^*OS$.

**Definition 2.8** [11] Let $\mathcal{A}_N$ be a $N'S$ in $N'TS X$. Then

1. $\mathcal{N}g^*int(\mathcal{A}_N) = \{G : G$ is a $Nag^*OS$ in $X$ and $G \subseteq \mathcal{A}_N\}$ is called a Neutrosophic $g^*$-interior of $\mathcal{A}_N$.
2. $\mathcal{N}g^*cl(\mathcal{A}_N) = \{K : K$ is a $Nag^*CS$ in $X$ and $\mathcal{A}_N \subseteq K\}$ is called Neutrosophic $g^*$-closure of $\mathcal{A}_N$.

**Definition 2.9** [8] A function $f_N : (X, \tau) \rightarrow (Y, \xi)$ is said to be $Nag^*$-continuous function if $f_N^{-1}(\mathcal{V}_N)_{\xi}$ is a $Nag^*$-closed set of $(X, \tau)$ for every Neutrosophic closed set $\mathcal{V}_N$ of $(Y, \xi)$.

**Definition 2.10** [8] A function $f_N : (X, \tau) \rightarrow (Y, \xi)$ is said to be Neutrosophic $g^*$ - irresolute function if $f_N^{-1}(\mathcal{V}_N)_{\xi}$ is a $Nag^*CS$ of $(X, \tau)$ for every $Nag^*CS$ of $(Y, \xi)$.

**Definition 2.11** [11] A Neutrosophic Topological space $(X, \tau)$ is called a $T_Nag^*$-space if every $Nag^*CS$ in $(X, \tau)$ is $NCS$ in $(X, \tau)$.

**Definition 2.14** [9] A function $f_N : (X, \tau) \rightarrow (Y, \xi)$ is said to be $Nag^*$ - contra continuous if $f_N^{-1}(\mathcal{V}_N)_{\xi}$ is a $Nag^*$-closed set of $(X, \tau)$ for every Neutrosophic open set $(Y, \xi)$.

**Definition 2.15** [9] A function $f_N : (X, \tau) \rightarrow (Y, \xi)$ is said to be $Nag^*$ - contra continuous if $f_N^{-1}(\mathcal{V}_N)_{\xi}$ is a $Nag^*$-closed set of $(X, \tau)$ for every Neutrosophic open set $(Y, \xi)$.

**Definition 2.16** [10] A function $f_N : (X, \tau) \rightarrow (Y, \xi)$ is said to be perfectly $Nag^*$-continuous if the inverse image of every $Nag^*$-closed set in $(Y, \xi)$ is both $Nag^*CS$ and $Nag^*OS$ (i.e., $Nag^*$ – clopen set) in $(X, \tau)$.

**III. Totally $Nag^*$ – Continuous Functions**

In this section, we introduce totally $Nag^*$ – continuous functions and discuss some of their interesting properties.

**Definition 3.1** A function $f_N : (X, \tau) \rightarrow (Y, \xi)$ is said to be totally $Nag^*$ – continuous if the inverse image of every Neutrosophic closed set in $(Y, \xi)$ is both $Nag^*CS$ and $Nag^*OS$ (i.e., $Nag^*$ – clopen set) in $(X, \tau)$.
Example 3.2 Let $X = \{l, m\} = \mathcal{Y}$. Consider the Neutrosophic sets

\begin{align*}
\mathcal{M}_{N_1} &= \{(l, (0, 0.4, 0.6)), (m, (0, 0.4, 0.6))\}, \\
\mathcal{M}_{N_2} &= \{(p, (0, 0.6, 0.7, 0.4)), (q, (0, 0.6, 0.7, 0.4))\}.
\end{align*}

Now $\tau = \{0_N, \mathcal{M}_{N_1}, \mathcal{M}_{N_2}, 1_N\}$ and $\xi = \{0_N, \mathcal{M}_{N_1}, 1_N\}$ are NTSs on $X$ and $\mathcal{Y}$ respectively.

Define $f_N : (X, \tau) \rightarrow (\mathcal{Y}, \xi)$ by $f_N(l) = l$ and $f_N(m) = m$. Here $\mathcal{N}g^\#(X) = \{0_N, \mathcal{M}_{N_1}, \mathcal{M}_{N_2}, 1_N\}$. Now $\mathcal{M}_{N_2}$ is NCS in $\mathcal{Y}$ and $f_N^{-1}(\mathcal{M}_{N_2})$ is $\mathcal{N}g^\#$ - clopen set in $(X, \tau)$. Therefore, $f_N$ is totally $\mathcal{N}g^\#$ - continuous.

Theorem 3.3 Every perfectly $\mathcal{N}g^\#$ - continuous function is totally $\mathcal{N}g^\#$ - continuous function but not conversely.

Proof. Let $f_N : (X, \tau) \rightarrow (\mathcal{Y}, \xi)$ be any neutrosophic function. Let $\mathcal{A}_X$ be a NCS in $(\mathcal{Y}, \xi)$. Then $\mathcal{A}_X$ is $\mathcal{N}g^\#CS$ in $(\mathcal{Y}, \xi)$. Since $f_N$ is a perfectly $\mathcal{N}g^\#$ - continuous function, $f_N^{-1}(\mathcal{A}_X)$ is both NCS and NOS in $(X, \tau)$. Which implies $f_N^{-1}(\mathcal{A}_X)$ is both $\mathcal{N}g^\#CS$ and $\mathcal{N}g^\#OS$ in $(X, \tau)$. Hence, $f_N$ is totally $\mathcal{N}g^\#$ - continuous function.

Example 3.4 Let $X = \{l, m\} = \mathcal{Y}$. Consider the Neutrosophic sets

\begin{align*}
\mathcal{M}_{N_1} &= \{(l, (0, 0.4, 0.3, 0.6)), (m, (0, 0.4, 0.4, 0.6))\}, \\
\mathcal{M}_{N_2} &= \{(p, (0, 0.6, 0.7, 0.4)), (q, (0, 0.6, 0.7, 0.4))\}, \\
\mathcal{M}_{N_3} &= \{(l, (0, 0.7, 0.8, 0.3)), (m, (0, 0.8, 0.8, 0.3))\}, \\
\mathcal{M}_{N_4} &= \{(l, (0, 0.3, 0.2, 0.7)), (m, (0, 0.3, 0.2, 0.8))\}.
\end{align*}

Now $\tau = \{0_N, \mathcal{M}_{N_1}, \mathcal{M}_{N_2}, \mathcal{M}_{N_3}, 1_N\}$ and $\xi = \{0_N, \mathcal{M}_{N_1}, 1_N\}$ are NTSs on $X$ and $\mathcal{Y}$ respectively.

Define $f_N : (X, \tau) \rightarrow (\mathcal{Y}, \xi)$ by $f_N(l) = l$ and $f_N(m) = m$. Here $\mathcal{N}g^\#(X) = \{0_N, \mathcal{M}_{N_1}, \mathcal{M}_{N_2}, \mathcal{M}_{N_3}, 1_N\}$. Now $\mathcal{M}_{N_2}$ is NCS in $\mathcal{Y}$ and $f_N^{-1}(\mathcal{M}_{N_2})$ is $\mathcal{N}g^\#$ - clopen set in $(X, \tau)$. Therefore, $f_N$ is totally $\mathcal{N}g^\#$ - continuous. But $\mathcal{M}_{N_3}$ is $\mathcal{N}g^\#CS$ in $\mathcal{Y}$ and $f_N^{-1}(\mathcal{M}_{N_3})$ is not $\mathcal{N}g^\#$ - clopen set in $(X, \tau)$. Therefore, $f_N$ is not perfectly $\mathcal{N}g^\#$ - continuous.

Theorem 3.5 Every totally $\mathcal{N}g^\#$ - continuous function is $\mathcal{N}g^\#$ - continuous function.

Proof. Let $f_N : (X, \tau) \rightarrow (\mathcal{Y}, \xi)$ be any neutrosophic function. Let $\mathcal{A}_X$ be a NCS in $(\mathcal{Y}, \xi)$. Since $f_N$ is a totally $\mathcal{N}g^\#$ - continuous function, $f_N^{-1}(\mathcal{A}_X)$ is both $\mathcal{N}g^\#CS$ and $\mathcal{N}g^\#OS$ in $(X, \tau)$. Which implies $f_N^{-1}(\mathcal{A}_X)$ is both $\mathcal{N}g^\#CS$ and $\mathcal{N}g^\#OS$ in $(X, \tau)$. Therefore, $f_N$ is totally $\mathcal{N}g^\#$ - continuous function.

Example 3.6 Let $X = \{l, m\} = \mathcal{Y}$. Consider the Neutrosophic sets

\begin{align*}
\mathcal{M}_{N_1} &= \{(l, (0, 0.4, 0.3, 0.6)), (m, (0, 0.4, 0.4, 0.6))\}, \\
\mathcal{M}_{N_2} &= \{(p, (0, 0.6, 0.7, 0.4)), (q, (0, 0.6, 0.7, 0.4))\}, \\
\mathcal{M}_{N_3} &= \{(l, (0, 0.7, 0.8, 0.3)), (m, (0, 0.8, 0.8, 0.3))\}, \\
\mathcal{M}_{N_4} &= \{(l, (0, 0.3, 0.2, 0.7)), (m, (0, 0.3, 0.2, 0.8))\}.
\end{align*}

Now $\tau = \{0_N, \mathcal{M}_{N_1}, \mathcal{M}_{N_2}, \mathcal{M}_{N_3}, 1_N\}$ and $\xi = \{0_N, \mathcal{M}_{N_1}, 1_N\}$ are NTSs on $X$ and $\mathcal{Y}$ respectively.

Define $f_N : (X, \tau) \rightarrow (\mathcal{Y}, \xi)$ by $f_N(l) = l$ and $f_N(m) = m$. Here $\mathcal{N}g^\#(X) = \{0_N, 1_N\}$. Now $\mathcal{M}_{N_2}$ is NCS in $\mathcal{Y}$ and $f_N^{-1}(\mathcal{N}g^\#)$ is $\mathcal{N}g^\#$ - clopen set in $(X, \tau)$. Therefore, $f_N$ is totally $\mathcal{N}g^\#$ - continuous. But $\mathcal{M}_{N_2}$ is NCS in $\mathcal{Y}$ and $f_N^{-1}(\mathcal{M}_{N_2})$ is not $\mathcal{N}g^\#$ - clopen set in $(X, \tau)$. Therefore, $f_N$ is not totally $\mathcal{N}g^\#$ - continuous.

Theorem 3.7 Let $f_N : (X, \tau) \rightarrow (\mathcal{Y}, \xi)$ be totally $\mathcal{N}g^\#$ - continuous function and $(\mathcal{Y}, \xi)$ be $\mathcal{T}_2g^\#$ - spaces. Then $f_N$ is $\mathcal{N}g^\#$ - irresolute function.

Proof. Let $\mathcal{A}_X$ be any $\mathcal{N}g^\#CS$ in $(\mathcal{Y}, \xi)$. Since $(\mathcal{Y}, \xi)$ is $\mathcal{T}_2g^\#$ - space, $\mathcal{A}_X$ is NCS in $(\mathcal{Y}, \xi)$. Since $f_N$ is totally $\mathcal{N}g^\#$ - continuous, $f_N^{-1}(\mathcal{A}_X)$ is both $\mathcal{N}g^\#CS$ and $\mathcal{N}g^\#OS$ in $(X, \tau)$. Therefore, $f_N^{-1}(\mathcal{A}_X)$ is $\mathcal{N}g^\#CS$ in $(X, \tau)$. Therefore, $f_N$ is $\mathcal{N}g^\#$ - irresolute function.
Remark 3.8 Composition of two totally $\mathcal{N}g^# -$ continuous functions need not be a totally $\mathcal{N}g^# -$ continuous.

Example 3.9 Let $X = \{p, q\} = Y = Z$. Consider the Neutrosophic sets

$\mathcal{M}_{N_1} = \{(p, (0, 4, 0.5, 0.6)), (q, (0, 3, 0.4, 0.7))\},$

$\mathcal{M}_{N_2} = \{(p, (0, 6, 0.5, 0.4)), (q, (0.7, 0.6, 0.3))\},$

$\mathcal{M}_{N_3} = \{(p, (0, 3, 0.4, 0.7)), (q, (0, 4.0, 5, 0.4))\},$

$\mathcal{M}_{N_4} = \{(p, (0.7, 0.6, 0.3)), (q, (0.6, 0.5, 0.4))\}.$

Now $(X, \tau) = \{0_{N_1}, \mathcal{M}_{N_1}, \mathcal{M}_{N_2} : 1_{N_1}\}, (Y, \zeta) = \{0_{N_2}, \mathcal{M}_{N_3}, \mathcal{M}_{N_4} : 1_{N_2}\} = (Z, \eta)$ are Neutrosophic topological spaces. Then $\tau = \{0_{N_1}, \mathcal{M}_{N_1}, \mathcal{M}_{N_2} : 1_{N_1}\}, \zeta = \{0_{N_2}, \mathcal{M}_{N_3}, \mathcal{M}_{N_4} : 1_{N_2}\}$ and $\eta = \{0_{N_2}, \mathcal{M}_{N_3}, 1_{N_2}\}$ are Neutrosophic topologies on $X, Y$ and $Z$ respectively. Define a function $f_{N_1} : (X, \tau) \rightarrow (Y, \zeta)$ by $f_{N_1}(p) = q$ and $f_{N_1}(q) = p$ and define a function $g_{N_2} : (Y, \zeta) \rightarrow (Z, \eta)$ by $g_{N_2}(p) = p$ and $g_{N_2}(q) = q$. Then $f_{N_1}$ and $g_{N_2}$ are $\mathcal{N}g^# -$ contra continuous functions. Now define a function $g_{N_2} \circ f_{N_1} : (X, \tau) \rightarrow (Z, \eta)$ by $g_{N_2} \circ f_{N_1}(p) = p$ and $g_{N_2} \circ f_{N_1}(q) = q$. Here $\mathcal{M}_{N_3}$ is a $\mathcal{N}CS$ in $(Z, \eta)$. But $(g_{N_2} \circ f_{N_1})^{-1}(\mathcal{M}_{N_4})$ is not a $\mathcal{N}g^#COS$ in $(X, \tau)$. Hence $(g_{N_2} \circ f_{N_1})$ is not totally $\mathcal{N}g^# -$ continuous function.

Theorem 3.10 Let $f_{N_1} : (X, \tau) \rightarrow (Y, \zeta)$ be a $\mathcal{N}g^# -$ irresolute function. Let $g_{N_2} : (Y, \zeta) \rightarrow (Z, \eta)$ be a totally $\mathcal{N}g^# -$ continuous function. Then $(g_{N_2} \circ f_{N_1}) : (X, \tau) \rightarrow (Z, \eta)$ is totally $\mathcal{N}g^# -$ continuous function.

Proof. Let $W_{N_1}$ be a $\mathcal{N}CS$ in $(Z, \eta)$. Since $g_{N_2}$ is totally $\mathcal{N}g^# -$ continuous, $g_{N_2}^{-1}(W_{N_1})$ is $\mathcal{N}g^#CS$ and $\mathcal{N}g^#OS$ in $(Y, \zeta)$. Since $f_{N_1}$ is $\mathcal{N}g^# -$ irresolute, $g_{N_2}^{-1}(g_{N_2}^{-1}(W_{N_1}))$ is $\mathcal{N}g^#CS$ and $\mathcal{N}g^#OS$ in $(X, \tau)$. Hence $g_{N_2} \circ f_{N_1}$ is totally $\mathcal{N}g^# -$ continuous function.

Theorem 3.11 Let $f_{N_1} : (X, \tau) \rightarrow (Y, \zeta)$ be a totally $\mathcal{N}g^# -$ continuous function. Let $g_{N_2} : (Y, \zeta) \rightarrow (Z, \eta)$ be a $\mathcal{N} -$ continuous function. Then $(g_{N_2} \circ f_{N_1}) : (X, \tau) \rightarrow (Z, \eta)$ is totally $\mathcal{N}g^# -$ continuous function.

Proof. Let $W_{N_1}$ be a $\mathcal{N}CS$ in $(Z, \eta)$. By hypothesis, $g_{N_2}^{-1}(W_{N_1})$ is a $\mathcal{N}CS$ in $(Y, \zeta)$. Since $f_{N_1}$ is totally $\mathcal{N}g^# -$ continuous, $g_{N_2}^{-1}(g_{N_2}^{-1}(W_{N_1}))$ is a $\mathcal{N}g^#CS$ and $\mathcal{N}g^#OS$ in $(X, \tau)$. Hence $g_{N_2} \circ f_{N_1}$ is totally $\mathcal{N}g^# -$ continuous function.

Theorem 3.12 Let $f_{N_1} : (X, \tau) \rightarrow (Y, \zeta)$ and $g_{N_2} : (Y, \zeta) \rightarrow (Z, \eta)$ be totally $\mathcal{N}g^# -$ continuous function and $(Y, \zeta)$ be $T_Ng^# -$ spaces. Then $g_{N_2} \circ f_{N_1} : (X, \tau) \rightarrow (Z, \eta)$ is totally $\mathcal{N}g^# -$ continuous function.

Proof. Let $\mathcal{A}_{N_1}$ be any $\mathcal{N}CS$ in $(Z, \eta)$. Since $g_{N_2}$ is totally $\mathcal{N}g^# -$ continuous, $g_{N_2}^{-1}(\mathcal{A}_{N_1})$ is both $\mathcal{N}g^#CS$ and $\mathcal{N}g^#OS$ in $(Y, \zeta)$. Since $(Y, \zeta)$ is $T_Ng^# -$ spaces, $g_{N_2}^{-1}(\mathcal{A}_{N_1})$ is a $\mathcal{N}CS$ in $(Y, \zeta)$. Since $f_{N_1}$ is totally $\mathcal{N}g^# -$ continuous, $f_{N_1}^{-1}(g_{N_2}^{-1}(\mathcal{A}_{N_1})) = (g_{N_2} \circ f_{N_1})^{-1}(\mathcal{A}_{N_1})$ is both $\mathcal{N}g^#CS$ and $\mathcal{N}g^#OS$ in $(X, \tau)$. Therefore, $g_{N_2} \circ f_{N_1}$ is totally $\mathcal{N}g^# -$ continuous function.

IV. Conclusion

In this article we introduced a new class of continuous function in Neutrosophic Topological space called totally $\mathcal{N}g^# -$ continuous functions. Moreover, characterizations of totally $\mathcal{N}g^# -$ continuous functions are analyzed and studied their properties.

References

[7]. S. Pious Missier, R.L. Babisha Julit , On Neutrosophic generalized closed sets, Punjab University Journal of Mathematics (Submitted)
[8]. S. Pious Missier, R.L. Babisha Julit , On Neutrosophic $g^# -$ Continuous Functions and Neutrosophic $g^# -$ Irresolute Functions, Abstract Proceedings of 24th FAI-ICDBSMD 2021 Vol. 6(i), pp.49(2021)
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[10]. S. Pious Missier, R.L. Babisha Julit, New Type of Continuous Functions in Neutrosophic Topological Space (submitted)