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Intuitionistic Fuzzy Supra Gα Closed Sets In Intuitionistic Fuzzy Supra Topological Spaces

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Abstract- Intuitionistic fuzzy supra topological space introduced by Necla Turanl which is a special case of intuitionistic fuzzy topological space .Aim of this present paper is we introduced Intuitionistic fuzzy Gα supra closed sets and Intuitionistic fuzzy Gα supra open sets in Intuitionistic fuzzy supra topological space and also we studied about its properties and characterizations

Index Terms-IFα supra open set, IFα supra closed set, IFGα supra open sets, IFGα supra closed sets, IFsupra topological spaces
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1. INTRODUCTION

L.A. Zadeh's[22]introduced fuzzy sets,then using these fuzzy setsC.L. Chang [4] was introduced and developed fuzzy topological space. Atanassov's[2] Intuitionistic fuzzy set, Using this Intuitionistic fuzzy sets Coker[5] introduced the notion of Intuitionistic fuzzy topological spaces. The supra topological spaces introduced and studied by A.S. Mashhour[10] in the year 1983. M. E. AbdEl-Monsef et al. [1] introduced the fuzzy supra topological spaces and studied fuzzy supra-continuous functions and obtained some properties and characterizations. In 2003 NeclaTuranl [21] introduced the concept of Intuitionistic fuzzy supra topological space.M. Parimala, [12] Jafari Saeid, introduce Intuitionistic fuzzy α-supra continuous maps in Intuitionistic fuzzy supra topological spaces. Aim of this paper is we introduced and studied about Intuitionistic fuzzy Gα supra closed sets and Intuitionistic fuzzy Gα supra open sets in Intuitionistic fuzzy supra topological spaces and its properties are discussed details.

2. PRELIMINARIES

Definition 2.1[3]

An Intuitionistic fuzzy set (IF for short) A is an object having the form A = $\{\langle x, \mu_A(x), \nu_A(x)\rangle : x \in X\}$
where the functions μ_A:X⟶ [0,1] and ν_A:X⟶ [0,1] denote the degree of membership (namely $\mu_A(x)$) and the degree of non-membership (namely $\nu_A(x)$) of each element x ∈ X to the set A respectively, and $0 \le \mu_A(x) + \nu_A(x) \le 1$ for each x ∈ X. Obviously, every fuzzy set A on a nonempty set X is an IFS of the following form

$$A =\{\langle x, \mu_A(x), 1- \mu_A(x)\rangle: x \in X\}.$$

Definition 2.2 [3]

Let A and B be two Intuitionistic fuzzy sets of the form
A = $\{\langle x, \mu_A(x), \nu_A(x)\rangle: x \in X\}$ and
B = $\{\langle x, \mu_B(x), \nu_B(x)\rangle : x\in X\}$. Then,

(i) A ⊆ B if and only if $\mu_A(x)\le\mu_B(x)$ and $\nu_A(x)\ge \nu_B(x)$ for all x ∈ X,
(ii) A = B if and only if A ⊆ B and A ⊇ B,
(iii) $A^C = \{\langle x, \nu_A(x), \mu_A(x)\rangle: x \in X\}$,
(iv) $A\cup B = \{\langle x, \mu_A(x) \vee\mu_B(x), \nu_A(x) \wedge\nu_B(x)\rangle: x \in X\}$,
(v) $A\cap B = \{\langle x, \mu_A(x) \wedge\mu_B(x), \nu_A(x) \vee\nu_B(x)\rangle: x \in X\}$.
(vi) $[\ ]A= \{\langle x, \mu_A(x), 1 - \mu_A(x)\rangle, x \in X\}$;
(vii) $\langle\rangle A = \{\langle x, 1 - \nu_A(x), \nu_A(x)\rangle, x \in X\}$;
The Intuitionistic fuzzy sets $0\sim = \langle x, 0, 1\rangle$ and $1\sim = \langle x, 1, 0\rangle$ are respectively the empty set and the whole set of X

Definition 2.3. [3]

Let $\{A_i:i \in J \}$ be an arbitrary family of Intuitionistic fuzzy sets in X. Then
(i) $\cap A_i = \{\langle x,\wedge\mu_{Ai}(x),\vee\nu_{Ai} (x) \rangle : x \in X\}$;
(ii) $\cup A_i = \{\langle x,\vee\mu_{Ai}(x),\wedge\nu_{Ai} (x) \rangle : x \in X\}$.

Definition 2.4.[3]

we must introduce the Intuitionistic fuzzy sets 0~and 1~in X as follows:
$0\sim = \{\langle x, 0, 1\rangle: x \in X\}$ and $1\sim = \{\langle x, 1, 0\rangle :x \in X\}$.

Definition 2.5[3]

Let A, B, C be Intuitionistic fuzzy sets in X. Then
(i) A ⊆B and C⊆D ⇒A ∪C B∪D and A∩C ⊆B∩D,
(ii) A ⊆B and A ⊆C ⇒A ⊆B ∩ C,
(iii) A ⊆C and B ⊆C ⇒A ∪B ⊆C,
(iv) A⊆B and B ⊆C ⇒A ⊆C,
(v)$\overline{A\ \cup\ B} = \bar{A} \cap\ \bar{B}$
(vi) $\overline{A\ \cap\ B} = \bar{A} \cup\ \bar{B}$,
(vii) A ⊆B ⇒$\bar{B}\subseteq\bar{A}$,
(viii) $\overline{(\bar{A})}$= A,
(ix) $\bar{1}\sim = 0\sim$,
(x) $\bar{0}\sim = 1\sim$.

Definition 2.6[3]

Let f be a mapping from an ordinary set X into an ordinary set Y, If B $=\{\langle y, \mu_B(y), \nu_B(y)\rangle : y \in Y\}$ is an IFST in Y, then the inverse image of B under f is an IFST defined by $f^{-1}(B)=\{\langle x, f^{-1}(\mu_B)(x), f^{-1}(\nu_B)(x)\rangle : x \in X\}$The image of IFST A $= \{\langle y, \mu_A(y), \nu_A(y)\rangle : y \in Y\}$ under f is an IFST defined by $f(A) = \{\langle y, f(\mu_A)(y), f(\nu_A)(y)\rangle : y \in Y\}$.

Definition 2.7 [3]

Let A, A_i ($i \in J$) be Intuitionistic fuzzy sets in X, B, B_i ($i \in K$) be Intuitionistic fuzzy sets in Y and f: $X \to Y$ is a function. Then

(i) $A_1 \subseteq A_2 \Rightarrow f(A_1) \subseteq f(A_2)$,
(ii) $B_1 \subseteq B_2 \Rightarrow f^{-1}(B_1) \subseteq f^{-1}(B_2)$,
(iii) $A \subseteq f^{-1}(f(A))$ { If f is injective, then $A = f^{-1}(f(A))$},
(iv) $f(f^{-1}(B)) \subseteq B$ { If f is surjective, then $f(f^{-1}(B)) = B$ },
(v) $f^{-1}(\cup B_j) = \cup f^{-1}(B_j)$
(vi) $f^{-1}(\cap B_j) = \cap f^{-1}(B_j)$
(vii) $f(\cup B_j) = \cup f(B_j)$
(viii) $f(\cap B_j) \subseteq \cap f(B_j)$ { If f is injective, then $f(\cap B_j) = \cap f(B_j)$}
(ix) $f^{-1}(1\sim) = 1\sim$,
(x) $f^{-1}(0\sim) = 0\sim$,
(xi) $f(1\sim) = 1\sim$, if f is surjective
(xii) $f(0\sim) = 0\sim$,
(xiii) $\overline{f(A)} \subseteq f(\bar{A})$, if f is surjective,
(xiv) $f^{-1}(\bar{B}) = \overline{f^{-1}(B)}$.

Definition 2.8[21]

A family τ_μ Intuitionistic fuzzy sets on X is called an Intuitionistic fuzzy supra topology (in short,IFST) on X if $0\sim \in \tau_\mu, 1\sim \in \tau_\mu$ and $\tau_\mu$is closed under arbitrary suprema. Then we call the pair (X,τ_μ) an Intuitionistic fuzzy supra topological space.

Each member of τ_μ is called an Intuitionistic fuzzy supra open set and the complement of an Intuitionistic fuzzy supra open set is called an Intuitionistic fuzzy supra closed set.

Definition 2.9 [21]

The Intuitionistic fuzzy supra closure of a set A is denoted by S-cl(A) and is defined as

S-cl (A) = $\cap$ {B: B is Intuitionistic fuzzy supra closed and $A \subseteq B$}.

The Intuitionistic fuzzy supra interior of a set A is denoted by S-int(A) and is defined as

S-int(A) = $\cup$ {B : B is Intuitionistic fuzzy supra open and $A \supseteq B$}

Definition 2.10[21]

(i). $\neg$ (AqB) $\Leftrightarrow A \subseteq B^C$.
(ii).A is an Intuitionistic fuzzy supra closed set in X$\Leftrightarrow$S-Cl (A) = A.
(iii). A is an Intuitionistic fuzzy supra open set in X$\Leftrightarrow$S-int (A)= A.
(iv). S-cl(A^C) = $(\text{S-int}(A))^C$.
(v). S-int(A^C) = $(\text{S-cl}(A))^C$.
(vi). $A \subseteq B \Rightarrow$ S-int(A) $\subseteq$ S-int(B).
(vii). $A \subseteq B \Rightarrow$ S-cl(A) $\subseteq$ S-cl(B).
(viii). S-cl($A \cup B$) =S-cl(A)$\cup$ S-cl(B).
(ix). S-int($A \cap B$) = S-int(A)$\cap$S-int(B).

Definition 2.11:[21]

An IFS A of an IFSTS $(X, \tau\mu)$ is an

(i) Intuitionistic fuzzy pre supra closed set (IFPSCS in short) if S-cl(S-int(A)) $\subseteq$ A,
(ii) Intuitionistic fuzzy pre supra open set (IFPSOS in short) if A $\subseteq$ S-int(S-cl(A)).

Definition 2.12:[21]

An IFS A of an IFSTS $(X, \tau\mu)$ is an

(i) Intuitionistic fuzzy α-supra open set (IFαSOS in short) if A$\subseteq$ S-int(S-cl(S-int(A))),
(ii) Intuitionistic fuzzy α-supra closed set (IFαSCS in short) if S-cl(S-int(S-cl(A))$\subseteq$A.

Definition 2.13:[21]

An IFS A of an IFSTS $(X, \tau\mu)$ is an

(i) Intuitionistic fuzzy supra regular open set (IFRSOS in short) if A = S-int(S-cl(A)),
(ii) Intuitionistic fuzzy regular supra closed set (IFRSCS in short) if A = S-cl(S-int(A)).

3. INTUITIONISTIC FUZZY GENERALIZED ALPHA SUPRA CLOSED SETS

In this section we introduce Intuitionistic fuzzy generalized supra closed sets and Intuitionistic fuzzy generalized alpha supra closed sets and studied some of its properties.

Definition 3.1

An IFS A of an IFSTS $(X, \tau\mu)$ is an Intuitionistic fuzzy generalized supra closed set (IFGSCS in short) if S-cl(A)$\subseteq$U whenever A$\subseteq$U and U is an IFSOS in X.

Definition 3.2:

An IFS A in $(X, \tau\mu)$ is said to be an Intuitionistic fuzzy generalized alpha supra closed set (IFGαSCS in short) if IFαS-cl(A)$\subseteq$U whenever A$\subseteq$U and U is an IFαSOS in (X, τ_μ).

The family of all IFGαSCSs of an IFSTS (X,τ_μ) is denoted by IFGαSC(X).

Example 3.3:

Let X={a, b} and let $\tau_\mu = \{0\sim, G_1, G_2, G_1 \cup G_2, 1\sim\}$ is an IFT on X, where $G_1 = \langle x, (0.2,0.3), (0.8,0.7)\rangle$, $G_2 = \langle x, (0.1,0.2), (0.9,0.8)\rangle$ Here the only IFα supra open sets are 0~, 1~ and G. Then the IFS $A=\langle x, (0.6, 0.7), (0.4,0.3)\rangle$ is an IFGαSCS in(X, τ_μ).

Theorem 3.4:

Every IFSCS in (X,τ_μ) is an IFGαSCS, but not conversely.

Proof:

Let A$\subseteq$U and U is an IFαSOS in $(X, \tau\mu)$ .Since IFαS-cl(A)$\subseteq$S-cl(A)and A is an IFSCS, IFαS-cl(A)$\subseteq$S-cl(A)=A$\subseteq$U.Therefore A is an IFGαSCS in X.

Example 3.5:

Let X={a,b} and let $\tau_\mu=\{0\sim, G_1, G_2, G_1 \cup G_2, 1\sim\}$ is an IFST on X where $G_1=\langle x, (0.3,0.2), (0.7,0.7)\rangle$. $G_2 =\langle x, (0.2,0.1),(0.8,0.8)\rangle$. Let $A=\langle x,(0.6,0.6), (0.3,0.4)\rangle$ be any IFS in X. Here IFαS-cl(A)$\subseteq$ G, whenever A $\subseteq$ G, for all IFαSOS G in X. A is an IFGαSCS, but not an IFSCS in X since S-cl(A)=$G^C \neq$A.

Theorem 3.6:

Every IFαSCS is an IFGαSCS but not conversely.

Proof:

Let A⊆U and U is an IFαSOS in (X,τ_μ).By hypothesis IFαS-cl(A)=A.Hence IFαS-cl(A)⊆U. Therefore A is an IFGαSCS in X.

Example 3.7:

Let X={a, b} and let τ_μ={0~, G_1,G_2,G_1∪G_2 ,1~} is an IFST on X where G_1=⟨x,(0.3,0.2),(0.6,0.8)⟩, G_2=⟨x,(0.2,0.1),(0.7,0.9)⟩.Let A=⟨x,(0.5,0.6),(0.3,0.3)⟩ be any IFS in X. Clearly IFαS-cl(A)⊆G, whenever A⊆G, for all IFαSOS G in X. Therefore A is an IFGαSCS, but not an IFαSCS in X. Since S-cl(S-int(S-cl(A))) = G^C⊈ A.

Theorem 3.8:

Every IFRSCS is an IFGαSCS but not conversely.

Proof: Let A is an IFRSCS in (X, τμ) . By Definition, A = S-cl(S-int(A)). This implies S-cl(A) = S-cl(S-int(A)). Therefore S-cl(A) = A. That is A is an IFSCS in X. By Theorem 3.4, A is an IFGαSCS in X

Theorem 3.9.

If A and B are IFGα-supra closed sets, then A∪ B is IFGα-supra closed set.

Proof:

If A ∪ B ⊆ G and G is IFS-supra open set, then A ⊆ G and B ⊆ G. Since A and B are IFGα-supra closed sets, S-cl(A) ⊆ G and S-cl(B) ⊆ G and hence S-cl(A) ∪ S-cl(B) ⊆ G. This implies S-cl(A ∪ B) ⊆ G. Thus A ∪ B is IFGα-supra closed set in X.

Theorem 3.10.

A Intuitionistic fuzzy set A is IFGα-supra closed set then S-cl(A)–A does not contain any nonempty Intuitionistic fuzzy supra closed sets.

Proof:

Suppose that A is IFGα-supra closed set. Let F be a Intuitionistic fuzzy supra closed subset of S-cl(A) – A.Then A⊆F^C.But A is IFGα-supra closed set. Therefore S-cl(A) ⊆ F^C. Consequently F⊆$(\text{S-cl(A)})^C$. We have F⊆S-cl(A).Thus F⊆S-cl(A)∩$(\text{S-cl(A)})^C = \phi$. Hence F is empty.

Theorem 3.11.

A Intuitionistic fuzzy set A is IFGα-supra closed set if and only if S-cl(A) – A contains no non-empty IFS-supra closed set.

Proof:

Suppose that A is IFGα-supra closed set. Let H be a IFS-supra closed subset of S-cl(A) – A. Then A ⊆ H^C. Since A is IFGα-supra closed set, we have S-cl(A) ⊆ H^C. Consequently H ⊆$(\text{S-cl(A)})^C$. Hence H ⊆ S-cl(A)∩$(\text{S-cl(A)})^C$=ϕ. Therefore H is empty.

Conversely,

Suppose that S-cl(A) – A contains no nonempty IFS-supra closed set. Let A ⊆ G and that G be IFS-supra open. If S-cl(A) ⊈ G, then S-cl(A)∩G^C is a non-empty IFS-supra closed subset of S-cl(A) – A. Hence A is IFGα-supra closed set.

Theorem 3.12.

Suppose that B ⊆ A ⊆ X, B is a IFGα-supra closed set relative to A and that A is IFGα-supra closed set in X.Then B is IFGα-supra closed set in X.

Proof:

Let B ⊆ G, where G is IFS-supra open in X. We have B ⊆ A∩G and A∩G is IFS-supra open in A. But B is a IFGα-supra closed set relative to A. Hence S-clA(B) ⊆ A∩G. Since S-clA(B) = A∩ S-cl(B). We have A∩S-cl(B) ⊆ A∩G. It implies A ⊆G∪$(\text{S-cl(B)})^C$ and G∪(S-cl(B))c is a IFS-supra open set in X. Since A is IFGα-supra closed in X, we have S-cl(A) ⊆ G∪$(\text{S-cl(B)})^C$.Hence S-cl(B) ⊆ G∪$(\text{S-cl(B)})^C$ and S-cl(B) ⊆ G. Therefore B is IFGα-supra closed set relative to X.

Theorem 3.13.

If A is IFGα-supra closed and A ⊆ B ⊆ S-cl(A),then B is IFGα-supra closed.

Proof:

Since B ⊆ S-cl(A), we have S-cl(B) ⊆ S-cl(A) and S-cl(B) – B ⊆ S-cl(A) – A. But A is IFGα-supra closed. Hence S-cl(A)–A has no non-empty IFS-supra closed subsets, neither does S-cl(B) – B. By theorem 3.11, B is IFGα-supra closed.

Theorem 3.14.

Let A ⊆ Y ⊆ X and suppose that A is IFGα-supra closed in X.Then A is IFGα-supra closed relative to Y.

Proof:

Let A⊆Y∩G where G is IFS-supra open in X. Then A ⊆G and hence S-cl(A)⊆G. This implies, Y∩S-cl(A)⊆ Y∩G. Thus A is IFGα-supra closed relative to Y.

Theorem 3.15.

If A is IFS-supra open and IFGα-supra closed, then A is Intuitionistic fuzzy supra closed set.

Proof:

Since A is IFS-supra open and IFGα-supra closed, then S-cl(A) ⊆ A. Therefore S-cl(A) =A. Hence A is Intuitionistic fuzzy supra closed.

Theorem 3.16:

If A is an IFSOS and an IFGαSCS in (X, τ_μ),then A is an IFαSCS in X.

Proof :

Let A is an IFSOS in X. Since A ⊆ A, by hypothesis IFαS-cl(A) ⊆ A. But from the definition A ⊆ IFαS-clA .Therefore IFαS-cl(A) = A. Hence A is an IFαSCS of X.

Theorem 3.17:

Let (X, τ_μ) be an IFSTS and A is an IFαSCS ofX.Then A is an IFGαSCS iff ¬(Aq F) implies ¬(αcl (A)qF) for every IFαSCS F of X.

Proof:

Necessity:

Let F be an IFαCS and ¬(AqF) then $A \subseteq F^C$ where F^C is an IFαSOS.Then IFαScl(A)$\subseteq F^C$, by hypothesis. Hence ¬(IFαS-cl(A) q F).

Sufficiency:

Let F is an IFαSCS in X and let A is an IFαSCS of X then by hypothesis, ¬(AqF) implies ¬(αScl(A)qF). Then IFαScl(A) $\subseteq F^C$ whenever $A \subseteq F^C$and F^C is an IFαSOS. Hence A is an IFαGSCS.

Theorem.3.18:

Let (X, τ_μ) be an IFSTS. Then IFαSO(X) = IFαSC(X) if and only if every IFS in (X, τ_μ) is an IFGαSCS.

Proof:

Necessity:

Suppose that IFαSO(X)=IFαSC(X). Let A ⊆ U and U is an IFSOS in X. This Implies IFαScl(A) ⊆ IFαScl(U) and U is an IFαSOS in X. Since by hypothesis U is an IFαSCS in X, IFαS-cl(U) = U. This implies IFαS-cl(A)⊆U. Therefore A is an IFGαSCS of X.

Sufficiency:

Suppose that every IFS in (X,τ_μ) is an IFGαSCS. Let U∈IFSO(X), then U∈IFαSO(X) and by hypothesis is IFαScl(U)⊆U⊆IFαS-cl(U).Therefore U∈ IFαSC(X). Hence IFαSO(X)⊆IFαSC(X).Let A∈IFαSC(X) then A^C is an IFαSOS in X.But IFαSO(X)⊆IFαSC(X). Therefore A∈ IFαSO(X).Hence IFαSC(X)⊆ IFαSO(X) .Thus IFαSO(X) = IFαSC(X).

4. INTUITIONISTIC FUZZY SUPRA Gα OPEN SETS

In this section, we introduce and study about Intuitionistic fuzzy supra Gα open sets and some of their properties.

Definition 4.1.

A Intuitionistic fuzzy set A in X is called IFGα-supra open in X if A^C is IFGα-supra closed in X.

Theorem 4.2.

A Intuitionistic fuzzy set A is IFGα-supra open if and only if F ⊆ S-int(A) where F is IFα-supra closed and F ⊆ A.

Proof:

Suppose that F ⊆ S-int(A) where F is IFα-supra closed and F ⊆ A. Let $A^C \subseteq G$ where G is IFS-supra open. Then $G^C \subseteq A$ and G^C is IFS-supra closed. Therefore $G^C \subseteq$ S-int(A). Since $G^C \subseteq$ S-int(A), we have $(\text{S-int}(A))^C \subseteq G$. This implies S-cl$((A)^C) \subseteq G$. Thus A^C is IFGα-supra closed. Hence A is IFGα-supra open.

Conversely, suppose that A is IFGα-supra open, F ⊆ A and F is IFα supra-closed.Then F^C is IFα-supra open and $A^C \subseteq F^C$. Therefore S-cl$((A)^C) \subseteq F^C$. But S-cl$((A)^C) = (\text{S-int}(A))^C$. Hence F ⊆S-int(A).

Theorem 4.3.

A Intuitionistic fuzzy set A is IFGα-supra open in X if and only if G = X whenever G is IFS-supra open and (S-int(A)∪A^C)⊆ G.

Proof:

Let A be a IFGα-supra open, G be IFα-supra open and (S-int(A)∪A^C) ⊆ G. This implies $G^C \subseteq (\text{S-int}(A))^C \cap ((A)^C)^C = (\text{S-int}(A))^C - A^C =$ S-cl$((A)^C) - A^C$. Since A^C is IFGα-supra closed and G^C is IFα-supra closed, By theorem 3.11, it follows that $G^C = \phi$. Therefore X = G.

Conversely, suppose that F is IFS-supra closed and F ⊆ A. Then S-int(A)∪A^C ⊆ S-int(A)∪F^C. This implies S-int(A)∪F^C=X and hence F ⊆ S-int(A). Therefore A is IFGα-supra open.

Theorem 4.4.

If S-int(A)⊆B⊆A and if A is IFGα-supra open ,then B is IFGα-supra open.

Proof:

Suppose that S-int(A) ⊆ B ⊆ A and A is IFGα-supra open .Then $A^C \subseteq B^C \subseteq$ S-cl(A^C) and since A^C is IFGα-supra closed. We have By theorem 3.11, B^C is IFGα-supra closed. Hence B is IFGα-supra open .

Theorem 4.5.

A Intuitionistic fuzzy set A is IFGα-supra closed, if and only if S-cl(A) – A is IFGα-supra open .

Proof:

Suppose that A is IFGα-supra closed set. Let H be a IFS supra-closed subset of S-cl(A) – A. Then $A \subseteq H^C$. Since A is IFGα-supra closed set, we have S-cl(A) ⊆ H^C. Consequently $H \subseteq (\text{S-cl}(A))^C$. Hence S ⊆ S-cl(A)∩$(\text{S-cl}(A))^C = \phi$. Therefore H is empty.

Conversely, suppose that S-cl(A) – A contains no nonempty IFS-supra closed set. Let A ⊆ G and that G be IFS-supra open. If S-cl(A) ⊆ G, then S-cl(A) ∩ G^C is a non-empty IFS-supra closed subset of S-cl(A) – A. Hence A is IFGα-supra closed set.

Theorem 4.6.

A Intuitionistic fuzzy set A is IFGα-supra closed, if and only if S-cl(A)–A is IFGα-supra open.

Proof:

Suppose that A is IFGα-supra closed. Let F⊆S-cl(A) – A Where F is IFS supra -closed. By theorem 3.11, F = ϕ. Therefore F⊆S-int((S-cl(A)–A) and by Theorem 4.2, we have S-cl(A)–A is IFGα-supra open. Conversely, let A ⊆ G where G is a IFS supra -open set. Then S-cl(A)∩G^C⊆S-cl(A)∩A^C =S-cl(A)–A.Since S-cl(A)⊆ G^C is IFS supra -closed and S-cl(A)– A is IFGα-supra open. By Theorem4.2, we have S-cl(A) ∩G^C ⊆ S-int(S-cl(A) – A =ϕ. Hence A is IFGα-supra closed.

Theorem 4.7.

For a subset A⊆X the following are equivalent:

(i) A is IFGα-supra closed.

(ii) S-cl(A) –A contains no non-empty IFS supra closed set.

(iii) S-cl(A) –A is IFGα-supra open set.

Proof:

Follows from theorem 3.12and Theorem 4.5.

Theorem 4.8:

An IFS A of an IFTS (X, τ_μ) is an IFGαOS if and only if G ⊆ IFαSint(A), whenever G is an IFαSCS(X) and G ⊆ A.

Proof:

Necessity:
Assume that A is an IFGαSOS in X. Also Let G be an IFαSCS in X such that G⊆A. Then G^C is an IFαSOS in X such that A^C⊆G^C.Since A^C is an IFGαSCS,IFαS-cl(A^C)⊆G^C.ButIFαS-cl(A^C)= (IFαScl (A))^C.HenceIFαScl(A^C)⊆G^C.This implies G⊆IFαS int(A).
Sufficiency: Assume that G⊆IFαS-int(A) ,whenever G is an IFαSCS and G⊆A.Then (IFαSint(A))^C⊆ G^C, whenever G^C is an IFαSOS and IFαScl(A^C)⊆G^C. Therefore A^C is an IFGαSCS. This implies A is an IFGαSOS.

4. CONCLUSION

Many different forms of generalized closed sets have been introduced over the years. Various interesting problems arise when one considers openness. Its importance is significant in various areas of mathematics and related sciences, this paper we introduced in IFGαS closed sets in Intuitionistic fuzzy supra topological spaces and investigate some of the basic properties. This shall be extended in the future Research with some applications.

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REFERENCES

[1] .M. E. Abd El-Monsef and A. E. Ramadan, On fuzzy supra topological spaces, Indian J. Pure and Appl. Math. no.4, 18(1987), 322-329.
[2] .Atnassova K., “Intuitionistic fuzzy Sets”, Fuzzy Sets and Systems, 20, 87-96,(1986).
[3] Atanassov K., 1988, Review and new results on Intuitionistic fuzzy sets, Preprint IM-MFAIS-1-88, Sofia.
[4] .Chang C.L. “Fuzzy Topological Spaces”, J. Math.Anal. Appl. 24 182-190,(1968).
[5] Coker, D. An introduction to Intuitionistic fuzzy topological spaces, Fuzzy Sets And Systems 88, 81-89, 1997.
[6] P.Deepika, S.Chandrasekar, "GS Closed Sets and Fine SG Closed Sets in Fine topological Space", International Journal of Mathematics Trends and Technology (IJMTT).V56(1):8-14 April 2018
[7] P.Deepika,S.Chandrasekar ,F-gs Open , F-gs Closed and F-gs Continuous Mappings in Fine Topological Spaces, International Journal of Engineering, Science and Mathematics,Vol.7 (4),April 2018, 351-359
[8] P.Deepika, S.Chandrasekar , M. Sathyabama, Properties Of Fine Generalized Semi Closed Sets In Fine Topological Spaces ,Journal Of Computer And Mathematical Sciences ,Vol9 No.4, April (2018),293-301
[9] C.Indirani ,On intutionistic fuzzy supra Pre-open set and Intutionistic Fuzzy supra-pre-continuity on Topological spaces, International Journal of Latest Trends in Engineering and Technology,Vol.(7)Issue (3), pp.354-363
[10] A.S. Mashhour, A.A.Allam, F.S. Mahmoud and F.H.Khedr,“On supra topological spaces”Indian J. Pure and Appl. vol. 4,14(1983),502-510.
[11] .R.Malarvizhi,S.Chandrasekar"Intuitionistic Fuzzy ω Supra Closed Sets Intuitionistic Fuzzy Supra Topological Spaces ", International Journal of Emerging Technologies and Innovative Research (www.jetir.org), ISSN:2349-5162, Vol.5, Issue 8, page no.380-384, August-2018
[12] .M. Parimala, JafariSaeid, Intuitionistic fuzzy α-supra continuous maps,”Annals of fuzzy mathematics and informatics”, vol.9,5(2015),745-751.
[13] .M. Parimala , C. Indirani,On Intuitionistic fuzzy Semi - Supra Open Set and Intuitionistic Fuzzy Semi Supra Continuous Functions Procedia Computer Science 47 (2015)319-325
[14] .R.Selvaraj, S.Chandrasekar, Contra Supra*g continuous Functions And Contra Supra*g-Irresolut Functions In Supra Topological Spaces, International Journal of Engineering Science and Mathematics
Vol. 7, I(4),April 2018, 127-133.
[15] .K.SafinaBegum,S.Chandrasekar, Contra Fine Sg-Continuous Maps In Fine Topological Space, Journal of Global Research in Mathematical Archives ,Vol.5,issue4, 37-43,Apr-2018
[16] [16].R.Selvaraj, S.Chandrasekar ,Supra*g-Closed Sets in Supra Topological Spaces, International Journal of Mathematic Trends and Technology (IJMTT),V56(1), 15-20,Apr-2018.
[17] R.Syed Ibrahim, S.Chandrasekar ,Intuitionistic Fuzzy γ Supra Open Sets, International Journal of Emerging Technologies and Innovative Research Vol.5, Issue 7, page no. Pp 417- 421, July-2018,
[18] .R.Syed Ibrahim, S.Chandrasekar,Intuitionistic Fuzzy γ Supra Open Mappings An Intuitionistic Fuzzy γ Supra Closed Mappings,International Journal of Research in Advent Technology, Vol.6, No.7, July 2018.
[19] R.Syed Ibrahim , S.Chandrasekar, IFquasi γ Supra Open and IFquasi γ Supra Closed Functions Inintuitionistic Fuzzy Supra Topological Spaces, Journal of Computer and Mathematical Sciences, Vol.9(8), 1017-1025 August 2018
[20] N.Turnal,“On Intuitionistic fuzzy Supra Topological spaces”, International Conference on Modeling and Simulation, Spain, vol.2, (1999) 69-77.

[21] N. Turnal, “An over view of Intuitionstic fuzzy Supra topological spaces”.Hacettepe Journal of Mathematics and Statistics, vol.32 (2003), 17-26.
[22] Zadeh, L. A. “Fuzzy sets”, Information and Control, 8(1965), 338-353.