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Study on Fuzzy Soft Hausdorff Spaces

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Abstract. The aim of this paper is to study some properties of fuzzy soft hausdorff space for this we have introduced notions like diagonal sets, injective,surjective,continuous functions. Also fuzzy soft compact is defined.

Keywords: Fuzzy soft diagonal set, fuzzy soft continuous function, fuzzy soft open, homeomorphism and fuzzy soft compact

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1. Introduction

Several set theories can be considered as tools for dealing with uncertainties,say theory of fuzzy sets [1], theory of institionistic fuzzy aets [4], theory Vague sets, theory of interval mathematics [2,5] and theory of rough sets [2], but all these theories have their own difficulties. The reason for these difficulties is possibly, the inadequaly of the parametrization tool of the theory as it was mentioned by Molodtsov in [9].

Fuzzy soft set which is a combination of fuzzy and soft sets were first introduced by Maji et.al. [8] in 2001. Many researchers improved this study and gave new results ([1],[3]). Aygunoglu and Aygun [6] applied fuzzy soft sets on group theory. Tanay and Kandemir [13] defined fuzzy soft topology on a fuzzy soft set over an intial universe. They introduced new concepts like fuzzy soft base, fuzzy soft neighborhood system, fuzzy soft subspace topology and they presented basic properties. Roy and Samanta [11] defined fuzzy soft topology over the initial universe and they introduced base and subbase for this space also they gave some characterizations.

Int this paper, notion like fuzzy soft diagonal set, fuzzy soft continuity, suzzy soft homeomorphism are introduced. The concept of fuzzy soft hausdorff is coined and some properties of this space is established.

2. Preliminaries

In this section we present some basic definitions of fuzzy soft set. Throughout our discussion, U refers to an intial universe, E the set of all parameters for U and $P(\widetilde{U})$ the set of all fuzzy sets of U. (U,E) means the universal set U and the parameter set E.

Definition 2.1. [6] A pair (F,E) is called a soft set (over U) if and only if F is a mapping of E into the set of all subsets of the set U.

In otherwords, the soft set is a parameterized family of subsets of the set U. Every set $F(\varepsilon), \varepsilon \in E$, from this familymay be considered as the set of ε elements of the soft set (F, E), or as the set of ε - approximate elements of the soft set.

Definition 2.2. [8] A pair (F, A) is called a fuzzy soft set over U where $F : A \to P(\tilde{U})$ is a mapping from A into $P(\tilde{U})$.

Definition 2.3 [8] For two fuzzy soft sets (F, A) and (G, B) in a fuzzy soft class (U,E), we say that (F, A) is a fuzzy soft subset of (G, B), if

(i) $A \subseteq B$

(ii) For all $\varepsilon \in A$, $F(\varepsilon) \subseteq G(\varepsilon)$ and is written as $(F, A) \tilde{\subseteq} (G, B)$.

Definition 2.4. [8] Union of two fuzzy soft sets (F, A) and (G, B) in a soft class (U,E) is a fuzzy soft set (H,C) where $C = A \cup B$ and $\forall \varepsilon \in C$,

$$H(\varepsilon) = \begin{cases} \mathrm{F}(\varepsilon), & \text{if } \varepsilon \in \mathrm{A - B} \\ \mathrm{G}(\varepsilon), & \text{if } \varepsilon \in \mathrm{B - A} \\ F(\varepsilon) \cup G(\varepsilon), & \text{if } \varepsilon \in \mathrm{A} \cap \mathrm{B} \end{cases}$$

and is written as $(\mathrm{F, A}) \tilde{\cup} (\mathrm{G, B}) = (\mathrm{H,C})$.

Definition 2.5. [8] Intersection of two fuzzy soft sets (F, A) and (G, B) in a soft class (U,E) is a fuzzy soft set (H, C) where $C = A \cap B$ and $\forall \varepsilon \in C$, $\mathrm{H}(\varepsilon) = \mathrm{F}(\varepsilon)$ *or* $\mathrm{G}(\varepsilon)$(as both are same fuzzy set) and is written as $(\mathrm{F, A}) \tilde{\cap} (\mathrm{G, B}) = (\mathrm{H,C})$.

Definition 2.6. [11] Let $A \subseteq E$ then the mapping $F_A : E \to \tilde{P}(U)$, defined by F_A(e) = $\mu^e F_A$ (a fuzzy subset of U), is called soft set over (U,E), where $\mu^e F_A = \tilde{0}$ if $e \in E - A$ and $\mu^e F_A \neq \tilde{0}$ if $e \in A$. The set of all fuzzy soft set over (U,E) is denoted by FS (U,E).

Definition 2.7. [11] The fuzzy soft set $F\varphi \in FS(U, E)$ is called null fuzzy soft set and it is denoted by $\tilde{\Phi}$. Here $F\phi\ (e) = \tilde{0}$ for every $e \in E$.

Definition 2.8. [11] Let $F_E \in FS(U, E)$ and $F_E(e) = \tilde{1}$ for all $e \in E$ .Then F_E is called absolute fuzzy soft set. It is denoted by $\tilde{E}$.

Definition 2.9. [11] Let $F_A, G_B \in FS(U, E)$. If $F_A(e) \subseteq G_B(e)$ for all $e \in E$, *i.e.*, if $\mu^e F_A \subseteq \mu^e G_B$ for all $e \in E$, *i.e.*, if

$\mu^e F_A(x) \le \mu^e G_B(x)$ for all $x \in U$ and for all $e \in E$, then F_A is said to be fuzzy soft subset of G_B, denoted by $F_A \tilde{\subseteq} G_B$.

Definition 2.10. [11] Let $F_A, G_B \in FS(U,E)$
Then the union of F_A and G_B is also a fuzzy soft set H_C, defined by $H_C(e) = \mu^e H_C = \mu^e F_A \cup \mu^e G_B$ for all $e \in$ E where $C = A \cup B$. Here we write $H_C = F_A \tilde{\cup} G_B$.

Definition 2.11. [11] Let F_A $G_B \in FS(U,E)$.
Then the intersection of F_A and G_B is also a fuzzy softset H_C defined by $H_C(e) = \mu^e H_C = \mu^e F_A \cap \mu^e G_B$ for all $e \in$ E where $C = A \cap B$. Here we write $H_C = F_A \tilde{\cap} G_B$.

Definition 2.12. Let $F_A \in FS(U,E)$. The complement of F_A is denoted by $F_A{}^C$ and is defined by $F_A{}^C : E \to \tilde{P}(U)$ is a mapping given by $F_A{}^C(\varepsilon) = [F(\varepsilon)]^C$, $\forall\, \varepsilon \in E$.

3. Fuzzy soft Hausdorff spaces

Definition 3.1. Let $FS(U,E)$ be the set of all fuzzy soft sets over U .Let $F_A \tilde{\in} FS(U,E)$ $a \tilde{\in} U$ and $A \tilde{\subseteq} E$. Then $(F_A)_\Delta$ is a fuzzy soft set over $I^{U\times U}$ for which $(F_A)_\Delta : E \to I^{U\times U}$ and $(F_A)_\Delta(e) = \Delta = \begin{Bmatrix} \mu_{F_e{}^{(a\times a)}}(s) if a = e \\ 0 \quad if a \neq e \end{Bmatrix}$. Then $(F_A)_\Delta$ is the fuzzy soft diagonal set.

Theorem 3.2. $(U,E,\Im)$ be a fuzzy soft hausdorff space if and only if the fuzzy soft diagonal set $(F_A)_\Delta$ is fuzzy soft closed.

Proof: Let $(U,E,\Im)$ be a fuzzy soft hausdorff space. We must show that $(F_A)_\Delta{}^C$ is fuzzy soft open. Suppose that $\mu_{F_e{}^{(a_1\times a_2)}} \tilde{\in} (F_A)_\Delta{}^C$ then $\mu_{F_e{}^{(a_1\times a_2)}} \tilde{\notin} (F_A)_\Delta$ and for some $S \tilde{\in} E$ $\mu_{F_e{}^{(a_1\times a_2)}}(s) \tilde{\notin} (F_A)_\Delta(s)(e)$. Denote $\mu_{F_e{}^{(a_1\times a_2)}}(s) = (\mu^{a_1}_{F_e} \times \mu^{a_2}_{F_e})(s)$. Thus $\mu^{a_1}_{F_e} \neq \mu^{a_2}_{F_e})$ and are two fuzzy soft points say F_e and $F_{e'}$ in the fuzzy soft topological space. Since $(U,E,\Im)$ is fuzzy soft hausdorff there exists $G_A, H_A \tilde{\in} \tilde{\Im}$ such that $F_e \tilde{\in} G_A$, $F_{e'} \tilde{\in} H_A$ with $G_A \tilde{\cap} H_A = \tilde{\phi}$. Hence for each $e \tilde{\in} F$, $\mu_{F_e{}^{(a_1\times a_2)}}(e) \tilde{\in} G_A(e) \times H_A(e)$ and $(G_A(e) \times H_A(e)) \tilde{\cap} (F_A)_\Delta = \tilde{\Phi}$. Hence $(F_A)_\Delta$ is fuzzy soft closed.

Conversly, let $(F_A)_\Delta$ is fuzzy soft closed. Let $F_e, F_{e'} \tilde{\in} (U,E,\Im)$ such that $F_e \neq F_{e'}$. Then $(F_e, F_{e'}) \tilde{\notin} (F_A)_\Delta$ and so $(F_e, F_{e'}) \tilde{\in} (F_A)_\Delta^C$ such that there exists fuzzy soft open sets H_A and G_A such that $(F_e, F_{e'}) \tilde{\in} H_A \times G_A \tilde{\subseteq} (F_A)_\Delta^C$. Hence $F_e \tilde{\in} H_A$ and $F_{e'} \tilde{\in} G_A$ again $H_A \tilde{\cap} G_A = \tilde{\Phi}$.

Definition 3.3. Let U, U' be universe sets E, E' be the corresponding parameter sets. The map $h_{up} : FS(U_E) \to FS(U'_{E'})$ is a fuzzy soft map from $U to U'$ which maps the fuzzy soft subset F_A *of* U to fuzzy soft subset $hup(F_A)\, of\, U'$ where $u : U \to U'$ and $p : E \to E'$ is defined as

$$[\ h_{up}(F_A)\ ]_{e'}(S') = \begin{cases} \sup\limits_{S \in U^{-1}(S')} \left[\sup\limits_{e \in P^{-1}(e')} F_A(e) \right](S) & if \quad p^{-1}(e') \neq \tilde{\Phi} \quad and \quad u^{-1}(S') \neq \tilde{\Phi} \\ 0 \qquad otherwise \end{cases}$$

Also the universe $[\ h_{up}^{-1}(F_{A'})\ ]_e$ is defined as

$$[\ h_{up}^{-1}(F_{A'})\ ]_e(S) = \begin{cases} F_{A'}(p(e)u(S), \, for \quad p(e) \tilde{\in} E' \\ 0 \qquad otherwise \end{cases}$$

Definition 3.4. Let $(U,E,\Im_1)$ and $(U,E,\Im_2)$ be two fuzzy soft topological spaces. A fuzzy soft mapping $h_{up} : FS(U_E) \to FS(U'_{E'})$ is said to be fuzzy soft continuous if $h_{up}^{-1}(F_A) \tilde{\in} \Im_1, \quad \forall F_A \tilde{\in} \Im_2$.

Theorem 3.5. If $(U,E,\Im)$ is fuzzy soft hausdorff and $h_{up} : FS(U_E) \to FS(U'_{E'})$ is a fuzzy soft map which is injective, surjective and fuzzy soft open then $(U', E', \Im')$ is fuzzy soft hausdorff .

Proof: Let $F_{e_1'}, F_{e_2'}$ be fuzzy soft sets in $FS(U_{E'})$ such that $F_{e_1'} \neq F_{e_2'}$. Since hup is surjective there exists F_{e_1}, F_{e_2} in $FS(U_E)$ such that $h_{up}(F_{e_1}) = F_{e_1'}$ and $h_{up}(F_A) \tilde{\in} \Im_2, \quad \forall F_A \tilde{\in} \Im_1$ and $F_{e_1} \neq F_{e_2}$. As $(U,E,\Im)$ is fuzzy soft hausdorff there exists $F_A, G_A \tilde{\in} \Im$ such that $F_{e_1} \tilde{\in} F_A$ and $F_{e_2} \tilde{\in} G_A$ and $F_A \tilde{\cap} G_A \cong \tilde{\Phi}$.

Hence for each $e \tilde{\in} E$, $F_{e_1} \tilde{\in} F_A(e)$ and $F_{e_2} \tilde{\in} G_A(e)$ and $F_A(e) \tilde{\cap} G_A(e) = \tilde{\Phi}$. Thus $h_{up}(F_{e_1}) = F_{e_1^1} \tilde{\in} h_{up}(F_A(e))$ and $h_{up}(F_{e_2}) = F_{e_2^1} \tilde{\in} h_{up}(G_A(e))$. Since h_{up} is fuzzy soft open $h_{up}(F_A)$ and $h_{up}(G_A)$ belongs to $\Im'$ .since h_{up} is injective , $h_{up}(F_A) \tilde{\cap} h_{up}(G_A) = h_{up}(F_A \tilde{\cap} G_A)$ = $\tilde{\Phi}$.

Thus $(U', E', \Im')$ is fuzzy soft hausdorff.

Definition 3.6. Fuzzy soft mapping $h_{up} : FS(U_{E_1}) \to FS(U'_{E_2})$ is called fuzzy soft open if $h_{up}(F_A) \tilde{\in} \Im_2, \textit{ forevery } \; F_A \tilde{\in} \Im_1$.

Definition 3.7. $h_{up} : FS(U_E) \to FS(U'_{E'})$ is said to be injective if u and p are injective.

It is said to be surjective if u and p aresurjective.

Definition 3.8. Let $(U, E, \Im)$ and $(U', E', \Im')$ be two fuzzy soft topological spaces. A fuzzy soft function $h_{up} : FS(U_E) \to FS(U'_{E'})$ is called homeomorphism if h_{up} is one to one, onto, continuous and open.

Theorem 3.9. In fuzzy soft hausdorff space, a sequence converges to a unique point.

Proof: Suppose that $\{F_{e_n}\}$ is a sequence in $(U, E, \Im)$ converging to $F_{e'}$ and let $F_{e_n} \neq F_{e'}$. Since $(U, E, \Im)$ is fuzzy soft hausdorff space there exist fuzzy soft open sets $F_A, G_A \tilde{\in} \Im$ such that $F_{e_1} \tilde{\in} F_A, F_{e_2} \tilde{\in} G_A$ and $F_A \tilde{\cap} G_A = \tilde{\Phi}$. This implies that for all $e \tilde{\in} E$, $F_{e_1} \tilde{\in} F_A(e), F_{e_2} \tilde{\in} G_A(e)$ and $F_A(e) \tilde{\cap} G_A(e) = \tilde{\Phi}$. As $\{F_{e_n}\}$ converges to $F_{e'}$ and F_A is fuzzy soft open set containing $F_{e'}$ there exist $n_1 \tilde{\in} N$ such that $F_{e_n} \tilde{\in} F_A$ for all $n \geq n_i$. Since F_{e_n} converges to $F_{e'}$ and G_A is fuzzy soft neighbourhood of $F_{e'}$ then there exists $n_2 \tilde{\in} N$ such that $F_{e_n} \tilde{\in} G_A$ for all $n \geq n_2$. Let $n_0 = \max(n_1, n_2)$ then for all $n \geq n_0, F_{e_n} \tilde{\in} F_A$ and $F_{e_n} \tilde{\in} G_A$. This implies that $F_{e_n} \tilde{\in} F_A(e) \textit{ and } F_{e_n} \tilde{\in} G_A(e)$ for all $e \tilde{\in} E$. Then $F_A(e) \tilde{\cap} G_A(e) \neq \tilde{\Phi}$. Hence $F_A \tilde{\cap} G_A \neq \tilde{\Phi}$. This is contradiction.

Definition 3.10. Let $F_A \tilde{\in} (U, E, \Im)$ and $G_B \tilde{\in} (U', E', \Im')$. The Cartesian product $F_A \times G_B$ is defined by $(F \times G)_{(A \times B)}$ as

$(F \times G)_{(A \times B)}$ (e)= $\mu^e_{F_A} \times \mu'^{e'}_{G_B}$ where $\mu^e_{F_A} \textit{ and } \mu'^{e'}_{G_B}$ are fuzzy subset of U and U' where $\mu^e_{F_A} = \tilde{0}$ if $e \tilde{\in} E - A$ and $\mu^e_{F_A} \neq \tilde{0}$ if $e \tilde{\in} A$ also $\mu'^{e'}_{G_B} = \tilde{0}$ if $e' \tilde{\in} E' - B$ and $\mu'^{e'}_{G_B} \neq \tilde{0}$ if $e \tilde{\in} B$.

Definition 3.11. Let $p: U \times U' \to U$, $p': U \times U' \to U'$ and $q: E \times E' \to E$, $q': E \times E' \to E'$ be the projections on first and second factors. Then (p,q) and (p',q') are homeomorphisms defined from $U \times U'$ to U and $U \times U'$ to U' as follows.

$$(p,q)(F_A \times G_B) = \mu^{q(e \times e')}_{p(F_A \times G_B)} \; where \;\; e \in A, e' \in B \quad = \mu^{e}_{F_A}$$

$$(p',q')(F_A \times G_B) = \mu'^{q'(e \times e')}_{p'(F_A \times G_B)} \; where \;\; e \in A, e' \in B \quad = \mu'^{e'}_{G_B}$$

Lemma 3.12. Let Let $(U, E, \Im)$ and $(U', E', \Im')$ be two fuzzy soft topological spaces. Then U, U' are homeomorphic to the subspace of $U \times U'$.

Proof: Let $(F_e, F_{e'}) \tilde{\in} U \times U'$ and $(e, e') \tilde{\in} E \times E'$. Our aim is to show that $h_{up}: U \to U \times \{F_{e'}\} \tilde{\subseteq} U \times U'$ is a homeomorphism where $u: U \to U \times \{F_{e'}\}$ and $p: E \to E \times \{e'\}$. u and p are one to one and onto, so h_{up} is one to one and onto.

Now, let us show that h_{up} is continuous. Let F_A be the fuzzy soft set in the subspace $U \times \{F_{e'}\}$. Then there exists open set $G_B \times H_C$ in the subspace $S(U \times U', E \times E')$ such that $F_A = (G_B \times H_C) \tilde{\cap} \tilde{E}_{U \times \{F_{e'}\}}$ for $p(e) = (e, e')$.

$$\left[(h_{up}^{-1})(F_A) \right]_{(e,e')}(S) = (h_{up}^{-1})((G_B \times H_C) \tilde{\cap} \tilde{E}_{U \times \{F_{e'}\}})_{(e,e')}(S)$$

$$= h_{up}^{-1}((G_B \times H_C) \tilde{\cap} \tilde{E}_{U \times \{F_{e'}\}})^{(S)}_{p(e)}$$

$$= h_{up}^{-1}((G_B(e) \times H_C(e')) \tilde{\cap} U \times \{F_{e'}\})^{(S)}_{p(e)}$$

$$= \begin{cases} h_{up}^{-1}(G_B(e) \times \{F_{e'}\})^{(s)}_{p(e)} \, if \; F_{e'} \tilde{\in} H_C(e') \\ \tilde{\Phi} \qquad\qquad otherwise \end{cases}$$

$$= \begin{cases} G_B(p(e)) \quad u(S) \quad for \quad F_{e'} \in H_C(e') \\ \tilde{\Phi} \qquad\qquad otherwise \end{cases}$$

Then $$(h_{up})^{-1}(F_A) = \begin{cases} G_B \;\; if \; F_{e'} \tilde{\in} H_C(e') \\ \tilde{\Phi} \quad otherwise \end{cases}$$

Hence $h_{up}^{-1}F_A$ is fuzzy soft open. So h_{up} is fuzzy soft continuous. Now we show that h_{up} is open. Let F_A be a fuzzy soft open set on U . For $e^{'} \in E$.

$$[(h_{up})(F_A)_{e^{'}}](s) = \begin{cases} \sup\limits_{s \in u^{-1}(s^{'})} [\sup\limits_{e \in p^{-1}(e^1)} F_A(e)](S) & if \quad p^{-1}(e^1) \neq \tilde{\Phi}\, and\, u^{-1}(s^{'}) \neq \tilde{\Phi} \\ 0 & otherwise \end{cases}$$

$$= \begin{cases} F_A(e) \times \{F_{e'}\}, p^{-1}(e^{'}) \tilde{\cap} A \neq \tilde{\Phi} \\ 0 & otherwise \end{cases}$$

Hence $(h_{up})F_A = F_A \times \{F_{e^{'}}\}$. Which is open and hence the mapping h_{up} is open.

Theorem 3.13. U and $U^{'}$ are fuzzy soft hausdorff spaces then $U \times U^{'}$ is fuzzy soft hausdorff space.

Proof: Let U and $U^{'}$ be fuzzy soft hausdorff spaces. Let $\mu_{F_e}(a_1 \times b_1), \mu_{F_e}(a_2 \times b_2) \tilde{\in} U \times U^{'}$ and $\mu_{F_e}(a_1 \times b_1) \neq \mu_{F_e}(a_2 \times b_2)$. So we have $\mu_{F_e} a_1 \neq \mu_{F_e} a_2$ or $\mu_{F_e} b_1 \neq \mu_{F_e} b_2$. Assume that $\mu_{F_e} a_1 \neq \mu_{F_e} a_2$ since U is fuzzy soft hausdorff space there exist fuzzy soft open set $F_A and G_B$ such that $\mu_{F_e} a_1 \tilde{\in} F_A$, $\mu_{F_e} a_2 \tilde{\in} G_B$ and $F_A \tilde{\cap} G_B = \tilde{\Phi}$. Then $F_A \times \tilde{E}^{'}$ and $G_B \times \tilde{E}^{'}$ are fuzzy soft open set on $U \times U^{'}$. Hence $(\mu_{F_e}(a_1 \times b_1)) \tilde{\in} F_A \times \tilde{E}^{'}$, $(\mu_{F_e}(a_2 \times b_2)) \tilde{\in} G_B \times \tilde{E}^{'}$ and $(F_A \times \tilde{E}^{'}) \tilde{\cap} (G_B \times \tilde{E}^{'}) = \tilde{\Phi}$.

Definition 3.14. Let $(U, E, \Im)$ be a fuzzy soft topological spaces. A collection of fuzzy soft open subsets of $\{ F_{A_\alpha} / \alpha \in \Im \}, (U, E, \Im)$ is said to form an open cover if $\tilde{E} = \tilde{\cup}_{\alpha \in \Im} F_{A_\alpha}$. If the finite subcollection of $\{ F_{A_\alpha} / \alpha \in \Im \}$ covers $\tilde{E}$ then $\tilde{E}$ is said to be fuzzy soft compact ie, $\tilde{E} = \tilde{\cup}_{i=1}^{n} F_{A_{\alpha_i}}$.

Theorem 3.15. Let $(U, E, \Im)$ be a fuzzy soft hausdorff space. If F_A is fuzzy soft compact on U , then F_A is fuzzy soft closed .

Proof: We must show that $F_A^{\ C}$ is fuzzy soft open. Let $F_e \tilde{\in} F_A^{\ C}$. Then $F_e \tilde{\notin} F_A$ choose $F_{e^{'}} \tilde{\in} F_A$ clearly $F_e \neq F_{e^{'}}$ for $e, e^{'} \tilde{\in} \tilde{E}$. As $\tilde{E}$ is fuzzy soft hausdorff there exist disjoint fuzzy soft open subsets G_B and $G_{c^{'}}$ for F_e and $F_{e^{'}}$ respectively such that $G_B \tilde{\cap} G_{C^{'}} = \tilde{\Phi}$, (ie) $F_e \tilde{\in} (G_B)_{F_{e^{'}}}$ and $F_{e^{'}} \tilde{\in} (G_{c^{'}})F_{e^{'}}$. Then $F_A(e) \tilde{\subseteq} (G_{c^{'}})(e)$. The collection

$E = \{(G_{c'})_{F_{e'}}(e) : F_{e'} \tilde{\in} F_A\}$ is a fuzzy soft open covering of F_A. As F_A is fuzzy soft compact there exist has a finite sub cover, so $F_A \tilde{\subseteq} \bigcup_{i=1}^{n}(G_{c'})_{F_{e'}}(e)$. It is clear that $\bigcup_{i=1}^{n}(G_{c'})_{F_{e'}}(e)$ and $\bigcap_{i=1}^{n}(G_B)_{F_{e'}}(e)$ are disjoint. Then $F_e \tilde{\in} (G_B)_{F_{e_i'}} \tilde{\subseteq} (\bigcup_{i=1}^{n}(G_c)_{F_{e_i'}})^C \tilde{\subseteq} F_A{}^C$. Hence $F_A{}^C$ is fuzzy soft open.

4. Conclusion

Fuzzy soft set are very popular subject researchers. This hybrid model which is more general than fuzzy and fuzzy soft sets can be applied several directions easily. In this paper we construct fuzzy soft hausdorff spaces and proved some theorems.

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