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# A Study on Soft $\alpha$-open Sets

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***Abstract:*** *The aim of this paper is to define the concepts of soft $\alpha$-open sets and soft $\alpha$-closed sets in soft topological spaces by studying the basics of soft set theory formulated by D. Molodstov.*
***Keywords:*** *soft set, soft topology, soft open sets and soft closed sets.*

## I. Introduction

After the introduction of Soft set theory by Molodtsov [4] in 1999 as a generic mathematical application in dealing with the vagueness of not well defined objects, many researchers followed him. Since the well established mathematical applications are very crisp and clear while computing on formal modeling, reasoning and computing, some of the engineering sciences, life sciences, social sciences and ecological sciences are not very clear always. Shabir and Naz [10] explained soft topological spaces and its basic notations in detail.

Maji [7] defined equality of two soft sets, subset and superset of Soft set, complement of a soft set, null soft set and absolute soft set with examples. With the latest advanced techniques researcher have now applied them in operations research, Riemans integration, Game theory, theory of probability and researched several basic notations of soft set theory. Naim et.al.,[8] presented the foundations of the theory of soft topological spaces to open the door for experiments for soft mathematical concepts and structures that are based on soft set-theoretic operations. Recently Soft topology has been studied in depth in the papers [1, 2, 3, 5, 6, 9, 11, 12, 13, 14]. In this paper, we make a theoretical study of the new set called soft $\alpha$-open set and soft $\alpha$-closed sets in soft topological space.

## II. Preliminaries

The following definitions are essential for the development of the paper.

**Definition 2.1.** [4] Let $U$ be an initial universe and $E$ be a set of parameters. Let $P(U)$ denote the power set of $U$. The pair $(F, E)$ or simply $F_E$, is called a *soft set* over $U$, where $F$ is a mapping given by $F : E \longrightarrow P(U)$. In other words, a soft set over $U$ is a parameterized family of subsets of the universe $U$. For $e \in U$, $F(e)$ may be considered as the set of e - approximate elements of the soft set $F$. The collection of all soft sets over $U$ and $E$ is denoted by $S(U)$. If $A \subseteq E$, then the pair $(F, A)$ or simply $F_A$, is called a *soft set* over $U$, where $F$ is a mapping $F : A \longrightarrow P(U)$. Note that for $e \notin A$, $F(e) = \phi$.

**Definition 2.2.** [7] The *union of two soft sets* of $F_B$ and $G_C$ over the common universe $U$ is the soft set $H_D$, where $B$ and $C$ are subsets of the parameter set $E$, $D = B \cup C$ and for all $e \in D$, $H(e) = F(e)$ if $e \in B - C$, $H(e) = G(e)$ if $e \in C - B$ and $H(e) = F(e) \cup G(e)$ if $e \in B \cap C$, we write $F_B \tilde{\cup} G_C = H_D$.

**Definition 2.3.** [7] The *intersection of two soft sets* of $F_B$ and $G_C$ over the common universe $U$ is the soft set $H_D$, where $D = B \cap C$ and for all $e \in D$, $H(e) = F(e) \cap G(e)$ if $D = B \cap C$. We write $F_B \tilde{\cap} G_C = H_D$.

**Definition 2.4.** [7] Let $F_B$ and $G_C$ be soft sets over a common universe set $U$ and $B, C \subseteq E$. Then $F_B$ is a *soft subset* of $G_C$, denoted by $F_B \tilde{\subseteq} G_C$, if (i) $B \subseteq C$ and (ii) for all $e \in B$, $F(e) = G(e)$. Also, $G_C$, is called the soft super set of $F_B$ and is denoted by $F_B \tilde{\supseteq} G_C$.

**Definition 2.5.** [7] The soft sets $F_B$ and $G_C$ over a common universe set $U$ are said to be *soft equal*, if $F_B \tilde{\subseteq} G_C$, and $F_B \tilde{\supseteq} G_C$. Then we write $F_B = G_C$.

**Definition 2.6.** [7] A soft set $F_B$ over $U$ is called a *null soft set* denoted by $F_\phi$, if for all $e \in B$, $F(e) = \phi$.

**Definition 2.7.** [8] The *relative complement* of a soft set $F_A$, denoted by $F_A^c$, is defined by the approximate function $f_{A^c}(e) = f_A^c(e)$, where $f_A^c(e)$ is the complement of the set $f_A(e)$, that is $f_A^c(e) = U - f_A(e)$ for all $e \in E$. It is easy to see that $(F_A^c)^c = F_A$, $F_\phi^c = F_E$ and $F_E^c = F_\phi$.

**Definition 2.8.** [7] Let $U$ be an initial universe and $E$ be a set of parameters. If $B \subseteq E$, the soft set $F_B$ over $U$ is called an *absolute soft set*, if for all $e \in B$, $F(e) = U$.

The following is the definition of soft topology used by various authors.

**Definition 2.9.** [1] Let $U$ be an initial universe and $E$ be a set of parameters. Let $\tau$ be a sub collection of $S(U)$, the collection of soft sets defined on $U$. Then $\tau$ is a *soft topology* if it satisfies the following conditions.
(i) $F_\phi$ , $F_E \in \tau$.
(ii) The union of any number of soft sets in $\tau$ belongs to $\tau$.
(iii) The intersection of any two soft sets in $\tau$ belongs to $\tau$.

If this definition is considered for further development, then the results are similar to that of results in topological spaces. Therefore, throughout the paper the following definition of soft topology is used.

**Definition 2.10.** [8] Let $U$ be an initial universe and $E$ be a set of parameters. Let $F_A \in S(U)$. A *soft topology* on $F_A$, denoted by $\tilde{\tau}$, is a collection of soft subsets of $F_A$ having the following properties:
1. $F_\phi$ , $F_A \in \tilde{\tau}$.
2. $\{F_{A_i} \tilde{\subseteq} F_A : i \in I\} \tilde{\subseteq} \tilde{\tau} \Rightarrow \tilde{\cup}_{i\in I} F_{A_i} \in \tilde{\tau}$ .
3. $\{F_{A_i} \tilde{\subseteq} F_A : 1 \le i \le n,\ n \in N\} \tilde{\subseteq} \tilde{\tau} \Rightarrow \tilde{\cap}_{i=1}^{n} F_{A_i} \in \tilde{\tau}$ . The pair $(F_A , \tilde{\tau})$ is called a soft topological spaces.

**Definition 2.11.** [10] Let $(F_A , \tilde{\tau})$ be a soft topological space in $F_A$. Elements of $\tilde{\tau}$ are called *soft open* sets. A soft set $F_B$ in $F_A$ is said to be a *soft closed set* in $F_A$, if its relative complement $F_B^C$ belongs to $\tilde{\tau}$.

In [13] it is established that under this definition of *soft closed sets*, Example 2.1 of [13] shows that no soft closed set exist in a soft topological space and moreover $F_\phi$ and $F_A$ are not soft closed sets. Therefore, we follow the following definition of soft closed sets.

**Definition 2.12.** [13] Let $(F_A , \tilde{\tau})$ be a soft topological space and $F_B \tilde{\subseteq} F_A$ . Then $F_B$ is said to be *soft closed set* in $F_A$, if the soft set $F_{B/A}^c$ , where *soft open* in $F_A$, where $F_{B/A}^c = F_B^c \tilde{\cap} F_A$ .

**Definition 2.13.** [14] Let $(F_A , \tilde{\tau})$ be a soft topological space and $F_B$ be a soft set in $F_A$.
(i) The *soft interior* of $F_B$ is the soft set $\mathrm{int}(F_B) = \tilde{\cup}\ \{F_C$ : $F_C$ is soft open set and $F_C \tilde{\subseteq} F_B\}$.
(ii) The *soft closure* of $F_B$ is the soft set $\mathrm{cl}(F_B) = \tilde{\cap}\ \{F_C$ : $F_C$ is soft closed set and $F_C \tilde{\supseteq} F_B\}$.

**Lemma 2.14.** [13] Let $(F_A , \tilde{\tau})$ be a soft topological space and $F_B$ and $F_C$ be a soft set in $F_A$. Then
(i) $\mathrm{int}(\mathrm{int}(F_B)) = \mathrm{int}(F_B)$.
(ii) $F_B \tilde{\subseteq} F_C$ implies $\mathrm{int}(F_B) \tilde{\subseteq} \mathrm{int}(F_C)$.
(iii) $\mathrm{int}(F_B) \tilde{\cap} \mathrm{int}(F_C) = \mathrm{int}(F_B \tilde{\cap} F_C)$.
(iv) $\mathrm{int}(F_B) \tilde{\cup} \mathrm{int}(F_C) \tilde{\subseteq} \mathrm{int}(F_B \tilde{\cup} F_C)$.

**Lemma 2.15.** [13] Let $(F_A , \tilde{\tau})$ be a soft topological space and $F_B$ and $F_C$ be a soft set in $F_A$. Then the following hold.
(i) $\mathrm{cl}(\mathrm{cl}(F_B)) = \mathrm{cl}(F_B)$.
(ii) $F_B \tilde{\subseteq} F_C$ implies $\mathrm{cl}(F_B) \tilde{\subseteq} \mathrm{cl}(F_C)$.
(iii) $(\mathrm{cl}(F_B))_{/A}^c = \mathrm{int}(F_{B/A}^c)$ and $(\mathrm{int}(F_B))_{/A}^c = \mathrm{cl}(F_{B/A}^c)$
(iv) $\mathrm{cl}(F_B) \tilde{\cap} \mathrm{cl}(F_C) \tilde{\supseteq} \mathrm{cl}(F_B \tilde{\cap} F_C)$.
(v) $\mathrm{cl}(F_B) \tilde{\cup} \mathrm{cl}(F_C) = \mathrm{cl}(F_B \tilde{\cup} F_C)$.

## III. Soft α-open Set and Soft α-closed Set

This section is devoted to the study of soft $\alpha$-open sets and Soft $\alpha$-closed sets where we use the Definition 2.11 of closed sets and discuss its properties.

**Definition 3.1.** Let $F_B$ be a soft subset of a soft topological space $(F_A , \tilde{\tau})$. $F_B$ is said to be a *soft α-open set*, if $F_B \tilde{\subseteq} \mathrm{int}(\mathrm{cl}(\mathrm{int}(F_B)))$.

**Example 3.2.** Let $U = \{a, b, c\}$, $E = \{e_1, e_2, e_3\}$, $A = \{e_1, e_2\} \tilde{\subseteq} E$.
$F_A = \{(e_1, \{a, b\}), (e_2, \{b, c\})\}$, $F_1 = \{(e_1, \{a\})\}$, $F_2 = \{(e_1, \{b\})\}$,
$F_3 = \{(e_1, \{a, b\})\}$, $F_4 = \{(e_2, \{b\})\}$, $F_5 = \{(e_2, \{c\})\}$, $F_6 = \{(e_2, \{b, c\})\}$,
$F_7 = \{(e_1, \{a\}), (e_2, \{b\})\}$, $F_8 = \{(e_1, \{a\}), (e_2, \{c\})\}$,
$F_9 = \{(e_1, \{a\}), (e_2, \{b, c\})\}$, $F_{10} = \{(e_1, \{b\}), (e_2, \{b\})\}$,
$F_{11} = \{(e_1, \{b\}), (e_2, \{c\})\}$, $F_{12} = \{(e_1, \{b\}), (e_2, \{b, c\})\}$,
$F_{13} = \{(e_1, \{a, b\}), (e_2, \{b\})\}$, $F_{14} = \{(e_1, \{a, b\}), (e_2, \{c\})\}$,
$F_{15} = F_A$, $F_{16} = F_\phi$.
Let $\tilde{\tau} = \{F_\phi, F_A, F_2, F_3, F_{11}, F_{12}, F_{14}\}$. Then $(F_A, \tilde{\tau})$ is a soft topological space. The family of all soft closed sets is $\{F_A, F_\phi, F_9, F_6, F_7, F_1, F_4\}$. The family of soft $\alpha$-open sets is $\{F_A, F_\phi, F_2, F_3, F_{10}, F_{11}, F_{12}, F_{13}, F_{14}\}$.

**Theorem 3.3.** Every soft open set in a soft topological space $(F_A, \tilde{\tau})$ is a soft $\alpha$-open set.
**Proof.** The proof follows from the Definition 3.1 □
The following Example 3.4 shows that the reverse implication of Theorem 3.3 is not true.

**Example 3.4.** Consider the soft topological space of Example 3.2. Here $F_{10}$ and $F_{13}$ are soft $\alpha$-open sets but not soft open sets.

**Theorem 3.5.** Let $(F_A, \tilde{\tau})$ be a soft topological space and $\{F_B : B \in I\}$ be a family of soft $\alpha$-open sets in $(F_A, \tilde{\tau})$. Then $\cup_{B\in I} F_B$ is also a soft $\alpha$-open set.
**Proof.** Let $\{F_B : B \in I\}$ be a family of soft $\alpha$-open sets in $(F_A, \tilde{\tau})$. Then for each $F_B$, $F_B \tilde{\subseteq}$ int(cl(int($F_B$))) and so $F_B \tilde{\subseteq}$ int(cl(int($F_B$)))$\tilde{\subseteq}$ int(cl(int($\cup F_B$))), since soft interior and closure are monotonic functions. This implies that $\cup F_B \tilde{\subseteq}$ int(cl(int($\cup F_B$))) and $\cup_{B\in I} F_B$ is a soft $\alpha$-open set.□

The following Lemma 3.6 is essential to prove that the intersection of two soft $\alpha$-open sets is a soft $\alpha$-open set. If $U$ is the universal set, $E$ is the parameter set and $A \subseteq E$, then $P = (e, \{u\})$ where $e \in A$ and $u \in U$, is a soft point in $F_A$ if $u \in F_A(e)$. In Theorem 2.10 of [13], it is established that a point $P \in$ cl($F_B$) if and only if every soft open set $F_C$ containing P soft intersects $F_B$.

**Lemma 3.6.** Let $(F_A, \tilde{\tau})$ be a soft topological space and $F_B$ and $F_C$ are any two soft sets in $(F_A, \tilde{\tau})$. If $F_C$ is a soft open set, then cl($F_B$) $\tilde{\cap}$ $F_C$ $\tilde{\subseteq}$ cl($F_B \tilde{\cap} F_C$).
**Proof .** Let P$\in$cl($F_B$)$\tilde{\cap} F_C$ . Then $P \in$cl($F_B$) and $P \in F_C$. If $F_D$ is soft open set containing $P \in F_A$, then $F_C \tilde{\cap} F_D$ is a soft open set containing $P$. Therefore, $P \in$cl($F_B$)$\Rightarrow (F_C \tilde{\cap} F_D) \tilde{\cap} F_B \neq F_\phi$
$\Rightarrow F_C \tilde{\cap}(F_D \tilde{\cap} F_B) \neq F_\phi \Longrightarrow P \in$cl($F_B \tilde{\cap} F_C$). Thus $P \in$cl($F_B$)$\tilde{\cap} F_C \Rightarrow$ $P \in$cl($F_B \tilde{\cap} F_C$).
Therefore cl($F_B$)$\tilde{\cap} F_C \tilde{\subseteq}$cl( $F_B \tilde{\cap} F_C$). □

**Theorem 3.7.** Let $(F_A, \tilde{\tau})$ be a soft topological space. If $F_B$ and $F_C$ are any two soft α-open sets in $(F_A, \tilde{\tau})$, then $F_B \tilde{\cap} F_C$ is a soft α-open set.
**Proof.** If $F_B$ and $F_C$ are any two soft $\alpha$-open sets in $(F_A, \tilde{\tau})$, then
$F_B \tilde{\subseteq}$ int(cl(int($F_B$))) and $F_C \tilde{\subseteq}$ int(cl(int($F_C$))).
Now, $F_B \tilde{\cap} F_C \tilde{\subseteq}$ int(cl(int($F_B$)))$\tilde{\cap}$ int(cl(int($F_C$)))
= int[cl(int($F_B$))) $\tilde{\cap}$ int(cl(int($F_C$)))]
$\tilde{\subseteq}$ int[cl[int($F_B$) $\tilde{\cap}$ int(cl(int($F_C$)))]], by Lemma 3.6
$\tilde{\subseteq}$ int[cl[int($F_B$)$\tilde{\cap}$ cl(int($F_C$))]],
$\tilde{\subseteq}$ int[cl[cl[int($F_B$)$\tilde{\cap}$ int($F_C$)]], by Lemma 3.6
= int(cl(int($F_B \tilde{\cap} F_C$))). Therefore, $F_B \tilde{\cap} F_C$ is a soft $\alpha$-open set. □

The following Theorem follows from Theorem 3.5 and Theorem 3.7.

**Theorem 3.8.** Let $(F_A, \tilde{\tau})$ be a soft topological space . If $\alpha(\tilde{\tau})$ is the family of all soft α-open sets, then $\alpha(\tilde{\tau})$ is a soft topology.

The following Theorem 3.9 gives a characterization of soft $\alpha$-open sets.

**Theorem 3.9.** Let $F_B$ be a subset of a soft topological space $(F_A, \tilde{\tau})$. Then $F_B$ is a soft $\alpha$-open set if and only if there exists a soft open set $F_C$ such that $F_C \tilde{\subseteq} F_B \tilde{\subseteq}$ int(cl($F_C$)).

**Proof.** Suppose that there exists a soft open set $F_C$ such that $F_C \tilde{\subseteq} F_B \tilde{\subseteq}$int(cl($F_C$)). Since $F_B \tilde{\subseteq}$int(cl($F_C$))=int(cl(int($F_C$))) $\tilde{\subseteq}$int(cl(int($F_B$))) by hypothesis and so by Lemma 2.14 (ii), $F_B$ is soft $\alpha$-open set. On the other hand, let $F_B$ be soft $\alpha$-open set. Then $F_B \tilde{\subseteq}$ int(cl(int($F_B$))). Let int($F_B$)=$F_C$. Since int($F_B$) $\tilde{\subseteq} F_B$ , $F_C \tilde{\subseteq} F_B$ and also $F_B \tilde{\subseteq}$ int(cl($F_C$)). Hence there exists a soft open set $F_C$ such that $F_C \tilde{\subseteq} F_B \tilde{\subseteq}$ int(cl($F_C$)). □

**Definition 3.10.** Let $(F_A, \tilde{\tau})$ be a soft topological space and $F_B$ be a soft subset of $F_A$. $F_B$ is said to be *soft α-closed set*, if its soft complement is a soft $\alpha$-open set.

One can easily prove the following Theorem 3.11.

**Theorem 3.11.** Let $(F_A, \tilde{\tau})$ be a soft topological space. Then the following hold. (i) Arbitrary intersection of soft $\alpha$-closed sets is a soft $\alpha$-closed sets. (ii) Finite union of soft $\alpha$-closed sets is a soft $\alpha$-closed sets. (iii) $F_A$ and $F_\phi$ are soft $\alpha$-closed set.

**Theorem 3.12.** Let $F_B$ be a subset of a soft topological space $(F_A, \tilde{\tau})$. Then $F_B$ is a soft $\alpha$-closed set if and only if there exists a soft closed set $F_C$ such that int(cl($F_C$)) $\tilde{\subseteq} F_B \tilde{\subseteq} F_C$.

**Proof.** Let $F_B$ be soft $\alpha$-closed set. Then cl(int(cl($F_B$))) $\tilde{\subseteq} F_B$ . Let cl($F_B$) = $F_C$ .Then $F_C$ is soft closed set. Since $F_B \tilde{\subseteq}$ cl($F_B$), $F_B \tilde{\subseteq} F_C$ and cl(int(cl($F_B$))) $\tilde{\subseteq} F_B \Rightarrow$ cl(int($F_C$)) $\tilde{\subseteq} F_B$. Thus there exists a soft closed set $F_C$ such that cl(int($F_C$)) $\tilde{\subseteq} F_B \tilde{\subseteq} F_C$. On the other hand, suppose there exists a soft closed set $F_C$ such that cl(int($F_C$)) $\tilde{\subseteq} F_B \tilde{\subseteq} F_C$ . Since $F_C$ is soft closed set, cl($F_C$)=$F_C$ , by hypothesis, cl(int($F_C$)) $\tilde{\subseteq} F_B \Rightarrow$ cl(int(cl($F_C$))) $\tilde{\subseteq} F_B$ . $F_B \tilde{\subseteq} F_C \Rightarrow$ cl($F_B$) $\tilde{\subseteq}$ cl($F_C$)$\Rightarrow$ cl(int(cl($F_B$))) $\tilde{\subseteq}$ cl(int(cl($F_C$))) $\tilde{\subseteq} F_B \Rightarrow F_B$ is soft $\alpha$-closed set. □

**Theorem 3.13.** Let $F_B$ be a subset of a soft topological space $(F_A, \tilde{\tau})$. Then $F_B$ is a soft $\alpha$-closed set if and only if cl(int(cl($F_B$ ))) $\tilde{\subseteq} F_B$.

**Proof.** Let $F_B$ be a soft α-closed set. So $F_B^c$ is a soft α-open set. Therefore, by Lemma 2.15(iii), $F_B^c \tilde{\subseteq}$int(cl(int($F_B^c$) ))=int(cl(cl$(F_B)^c$)=int[int(cl$(F_B)$)]$^C$= [cl(int(cl$(F_B)$))]$^C$ $\Rightarrow$ cl(int(cl($F_B$))) $\tilde{\subseteq}$ $F_B$. The converse part is similar. □

**Definition 3.14.** Let $(F_A, \tilde{\tau})$ be a soft topological space and $F_B$ be a soft set in $F_A$.

(i) The *soft α-interior* of $F_B$ is the soft set $\tilde{\cup}$ {$F_C$ : $F_C$ is soft α-open set and $F_C \tilde{\subseteq} F_B$ } and is denoted by α-int($F_B$).

(ii) The *soft α-closure* of $F_B$ is the soft set $\tilde{\cap}$ {$F_C$ : $F_C$ is soft α-closed set and $F_C \tilde{\supseteq} F_B$ } and is denoted by α-cl($F_B$).

Clearly, $\alpha$-cl($F_B$) is the smallest soft $\alpha$-closed set containing $F_B$ and $\alpha$- int($F_B$) is the largest soft $\alpha$-open set contained in $F_B$ .

**Remarks 3.15.** Let $(F_A, \tilde{\tau})$ be a soft topological space and let $F_B$ be a soft set in $F_A$. Then $(F_A, \tilde{\tau})$ is also a soft topological space. Hence proof of the following Theorems 3.16 , 3.17 and 3.18 follow from the similar already established results.

**Theorem 3.16.** Let $(F_A, \tilde{\tau})$ be a soft topological space and let $F_B$ be a soft set in $F_A$. Then

(i) $F_B$ belongs to soft $\alpha$-closed set in $(F_A, \tilde{\tau})$ if and only if $F_B = \alpha$-cl($F_B$).

(ii) $F_B$ belongs to soft $\alpha$-open set in $(F_A, \tilde{\tau})$ if and only if $F_B = \alpha$-int($F_B$).

(iii) $\alpha$-cl($F_\phi$) = $F_\phi$ and $\alpha$-cl($F_A$) = $F_A$.

(iv) $\alpha$-int($F_\phi$) = $F_\phi$ and $\alpha$-int($F_A$) = $F_A$.

(v) $\alpha$-cl($\alpha$-cl($F_B$)) = $\alpha$-cl($F_B$).

(vi) $\alpha$-int($\alpha$-int($F_B$)) = $\alpha$-int($F_B$).

(vii) ($\alpha$-cl($F_B$ ))$^C$ = $\alpha$-int($F_B^C$).

(viii) ($\alpha$-int($F_B$ ))$^C$ = $\alpha$-cl($F_B^C$).

**Theorem 3.17.** Let $(F_A, \tilde{\tau})$ be a soft topological space and let $F_B$ and $F_C$ be two soft sets in $F_A$, then

(i) $F_B \tilde{\subseteq} F_C \Rightarrow \alpha$-int($F_B$) $\tilde{\subseteq} \alpha$-int($F_C$).

(ii) $F_B \tilde{\subseteq} F_C \Rightarrow \alpha$-cl($F_B$) $\tilde{\subseteq} \alpha$-cl($F_C$).

(iii) $\alpha$-cl($F_B \tilde{\cup} F_C$) = $\alpha$-cl($F_B$)$\tilde{\cup}\alpha$-cl($F_C$).

(iv) $\alpha$-int($F_B \tilde{\cap} F_C$) = $\alpha$-int($F_B$) $\tilde{\cap}\alpha$-int($F_C$).

(v) $\alpha$-cl$(F_B \widetilde{\cap} F_C) \widetilde{\subseteq} \alpha$-cl$(F_B) \widetilde{\cap} \alpha$-cl$(F_C)$.
(vi) $\alpha$-int$(F_B \widetilde{\cup} F_C) \widetilde{\supseteq} \alpha$-int$(F_B) \widetilde{\cup} \alpha$-int$(F_C)$.

The proof of the following Theorem follows from Lemma 3.6.

**Theorem 3.18.** Let $(F_A, \tilde{\tau})$ be a soft topological space and $F_B$ and $F_C$ are any two soft sets in $(F_A, \tilde{\tau})$. If $F_C$ is a soft $\alpha$-open set, then $F_C \widetilde{\cap} \alpha$-cl$(F_B) \widetilde{\subseteq} \alpha$-cl$(F_B \widetilde{\cap} F_C)$.

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