**A**nnals of **F**uzzy **M**athematics and **I**nformatics
Volume 6, No. 3, (November 2013), pp. 727–742
ISSN: 2093–9310 (print version)
ISSN: 2287–6235 (electronic version)
http://www.afmi.or.kr



# An application on soft $\tilde{L}$-fuzzy convergence structure

T. Yogalakshmi, E. Roja, M. K. Uma

Received 29 October 2012; Received 27 December 2012; Accepted 7 January 2013

Abstract. In this paper, the concept of soft $\tilde{L}$-fuzzy set is introduced. A new notion of soft $\tilde{L}$-fuzzy convergence structure on the basis of soft fuzzy filter is introduced. The main aim of this paper is to present an application on soft $\tilde{L}$-fuzzy convergence structure which has been discussed analogously as in the paper of Thomas Kubiak. Besides, characterization and several properties of soft $\tilde{L}$-fuzzy C-$lim$-convergence extremally disconnected space are established.

2010 AMS Classification: 54A40, 03E72

Keywords: Soft fuzzy filter, Soft $\tilde{L}$-fuzzy set, Soft $\tilde{L}$-fuzzy real line, Soft $\tilde{L}$-fuzzy convergence structure, Soft $\tilde{L}$-fuzzy $lim$-convergence topology, Soft $\tilde{L}$-fuzzy C-$lim$-convergence extremally disconnected space, Characteristic$^*$ function.

Corresponding Author: T. Yogalakshmi (YogaPrithvi_ssp@yahoo.co.in)

## 1. Introduction

Zadeh [19] introduced the fundamental concepts of fuzzy sets in his classsical paper. The fuzzy concept in various branches of Mathematics was developed by Rodabaugh [11, 12, 13]. Fuzzy sets have applications in many fields such as information [7] and control [9]. In mathematics, topology provided the most natural framework for the concepts of fuzzy sets to flourish. Fuzzy topological space was introduced by C.L.Chang[1]. Bruce Hutton[3] constructed an interesting L-fuzzy topological space, called L-fuzzy unit interval, which plays the same role in fuzzy topology that the unit interval plays in general topology. Thomas Kubiak[14] introduced and studied about the properties of L-sets. Thomas Kubiak[15] also investigated the Tietze Extension Theorem using L-fuzzy sets in normal spaces. Kent[4] introduced the concept of convergence space whereas Richardson.G [10] established the fuzzy convergence space on the basis of fuzzy filters.

The concept of soft set theory was introduced by D.Molodtsov [6]. The idea of fuzzy soft sets, introduced and developed by P.K.Maji, R.Biswas, A.R.Roy [5]. The concept of soft fuzzy set over a poset I was introduced by Ismail U. Tiryaki [16]. A new idea of C-set in topological space was introduced and developed by E.Hatir, T.Noiri and S.Yuksel [2] in 1996. The concept of C-set in fuzzy topological space was introduced by M.K.Uma, E.Roja and G.Balasubramanian [17] in 2005. T.Yogalakshmi, E.Roja, M.K.Uma [18] introduced the notion of a soft fuzzy C-open set in the soft fuzzy topological space.

In this paper, the notion of soft $\tilde{L}$-fuzzy set is introduced. The concept of soft $\tilde{L}$-fuzzy convergence structure on the basis of soft fuzzy filter is introduced. Using Sostak's idea [8] on the structure, soft $\tilde{L}$-fuzzy C-*lim*-convergence topology is established. The concept of soft $\tilde{L}$-fuzzy C-*lim*-convergence extremally disconnected space and its characterizations are discussed. In this connection, Insertion and Extension Theorem are established, which is one of the most applicable one in digital space.

## 2. Preliminaries

**Definition 2.1** ([4]). A *convergence space* is a pair $(X, q)$, where $X$ is a set and $q : F(X) \to 2^X$ satisfies the following:

(CS1) $x \in q(\dot{x})$, for each $x \in X$, where $\dot{x}$ is the ultrafilter containing $\{x\}$.

(CS2) $q(\mathcal{F}) \subseteq q(\mathcal{G})$, when $\mathcal{F} \subseteq \mathcal{G}$.

(CS3) $q(\mathcal{F}) = \cap\{q(\mathcal{G}) : \mathcal{G}$ is an ultrafilter containing $\mathcal{F}\}$

**Definition 2.2** ([3]). Let $X$ be a set and $L$ be a complete lattice. An *L-fuzzy set* on $X$ is a map from $X$ into $L$. That is, if $\lambda$ is a L-fuzzy subset of $X$ then $\lambda \in L^X$, where $L^X$ denotes the collection of all maps from $X$ into $L$.

**Definition 2.3** ([10]). The pair $(X, lim)$ is called as a *fuzzy convergence space*, where $lim : \mathbb{F}(X) \to I^X$ provided :

(FC1) $\forall\ \ \mathfrak{F} \in \mathbb{F}(X), lim\ \mathfrak{F} = \sqcap_{\mathfrak{G} \in \mathbb{P}_m(\mathfrak{F})}\ lim\ \mathfrak{G}$.

(FC2) $\forall\ \ \mathfrak{F} \in \mathbb{F}_p(X), lim\ \mathfrak{F} \sqsubseteq c(\mathfrak{F})$.

(FC3) $\forall\ \ \mathfrak{F}, \mathfrak{G} \in \mathbb{F}_p(X)$, when $\mathfrak{F} \sqsubseteq \mathfrak{G} \Rightarrow lim\ \mathfrak{G} \sqsubseteq lim\ \mathfrak{F}$.

(FC4) $\forall\ \ x \in X, 0 < \alpha \leq 1, lim\ (\alpha \dot{1}_x) \sqsupseteq (\alpha 1_x)$

**Definition 2.4** ([16, 18]). Let $X$ be a nonempty set and I=[0,1] be the unit interval. Let $\mu$ be a fuzzy subset of $X$ such that $\mu : X \to [0, 1]$ and $M$ be any crisp subset of $X$. Then, the pair $(\mu, M)$ is called as a *soft fuzzy set* in $X$. The family of all soft fuzzy subsets of $X$,will be denoted by **SF(X)**.

**Definition 2.5** ([18]). Let $X$ be a non-empty set. Then the *complement* of a soft fuzzy set $(\mu, M)$ is defined as $(\mu, M)' = (1 - \mu, X|M)$

**Definition 2.6** ([18]). Let $(X, \tau)$ be a SFTS. A soft fuzzy set $(\lambda, N)$ is said to be *soft fuzzy C-open* , if

$$(\lambda, N)=(\mu, M) \sqcap (\gamma, K)$$

where, $(\mu, M)$ is a soft fuzzy open set and $(\gamma, K)$ is a soft fuzzy $\alpha^*$-open set.

The complement of soft fuzzy C-open set ( in short. **SFcOS**) is called as a *soft fuzzy C-closed set.* (in short.**SFcCS** )

## 3. On soft $\tilde{L}$-fuzzy set

Throughout this paper $< \tilde{L}, \sqcup, \sqcap, ' >$ is an infinitely distributive lattice with an order-reversing involution. Such a lattice being complete has a least element (0,0) and greatest element (1,1) .

**Definition 3.1.** Let $X$ be a non-empty crisp set. A *soft fuzzy filter*, $\mathfrak{F}$ is a non-empty collection of soft fuzzy sets in $X$ provided:
(1) $(\lambda, N) \notin \mathfrak{F}$ such that either $\lambda = 1_\phi$ or $N = \phi$.
(2) $(\mu, M), (\lambda, N) \in \mathfrak{F} \Rightarrow (\mu, M) \sqcap (\lambda, N) \in \mathfrak{F}$.
(3) $(\lambda, N) \in \mathfrak{F}$ and $(\lambda, N) \sqsubseteq (\mu, M) \Rightarrow (\mu, M) \in \mathfrak{F}$.

**Note:** If $A \subseteq X$, then $1_A$ denotes the characteristic function of A, and $1_{\{x\}}$ is written simply as $1_x$.

**Definition 3.2.** A soft fuzzy filter $\mathfrak{F}$ is said to be a *soft fuzzy prime filter* , whenever $(\lambda, N) \sqcup (\mu, M) \in \mathfrak{F}$ with either $\widehat{(\lambda, N)} \neq \phi$ or $\widehat{(\mu, M)} \neq \phi \Rightarrow (\mu, M) \in \mathfrak{F}_c$ or $(\lambda, M) \in \mathfrak{F}$

**Notation:** $\widehat{(\lambda, N)} = \{x \in X : \lambda(x) > 0 \text{ and } x \in N\}$ and $(\lambda, N)_0 = \{x \in X : \lambda(x) > 0 \text{ or } x \in N\}$.
**Note :**

- The set of all soft fuzzy prime filters on $X$ is denoted by $\mathbb{F}_p(X)$.
- The set of all soft fuzzy filters on $X$ is denoted by $\mathbb{F}(X)$.
- The set of all soft fuzzy prime filters containing $\mathfrak{F}$ on $X$ is denoted by $\mathbb{F}_p(\mathfrak{F})$.
- The set of all filters on $X$ is denoted as $F(X)$.
- The set $\mathfrak{F} \in \mathbb{F}(X)$ of all soft fuzzy filters is ordered by set inclusion. For $\mathfrak{F} \in \mathbb{F}(X)$, the set $\mathbb{F}_p(X)$ of all soft fuzzy prime filters finer than $\mathfrak{F}$ is inductive and by Zorn's lemma, there exist minimal elements in $\mathbb{F}_p(\mathfrak{F})$ on $X$, the set of which is denoted by $\mathbb{P}_m(\mathfrak{F})$. It follows that,
$$\mathfrak{F} = \sqcap_{\mathfrak{G} \in \mathbb{P}_m(\mathfrak{F})} \mathfrak{G}.$$

**Definition 3.3.** The *soft fuzzy principal filter* $\widetilde{(\mu, M)}$ is the soft fuzzy filter generated by singleton set $\{(\mu, M)\}$, that is,
$$\widetilde{(\mu, M)} := [\{(\lambda, N) \in SF(X) : (\mu, M) \sqsubseteq (\lambda, N)\}]$$

**Definition 3.4.** Let $X$ be a non-empty set and $L$ be any lattice. Let $N \subseteq X$. Associated to each soft fuzzy set $(\lambda, N)$, a soft fuzzy $\tilde{L}$-fuzzy set is defined. A *soft $\tilde{L}$-fuzzy set*, $(\lambda, \psi_N)$ in $X$ is an element of the set of all functions from $X$ to $L \times L$, where $\lambda$ is L-fuzzy set on $X$ and $\psi_N : X \to L$ such that
$$\psi_N(x) = \begin{cases} 1, & \text{if } N = X \\ \mathfrak{l} \in L \ (0 < \mathfrak{l} < 1), & \text{if } x \in N \\ 0, & \text{if } N = \phi \end{cases}$$

The family of all soft $\tilde{L}$-fuzzy sets, is denoted by $\tilde{L}^X$.

**Definition 3.5.** Let $X$ be a non-empty set and the soft $\tilde{L}$-fuzzy sets $A$ and $B$ be in the form,

$$A = \{(\mu, \psi_M) : \mu(x) \in L \text{ and } \psi_M(x) \in L, \forall x \in X\}$$
$$B = \{(\lambda, \psi_N) : \lambda(x) \in L \text{ and } \psi_N(x) \in L, \forall x \in X\}$$

Then,

(1) $A \sqsubseteq B \Leftrightarrow \mu(x) \leq \lambda(x) \text{and} \psi_M(x) \leq \psi_N(x), \forall x \in X$.
(2) $A = B \Leftrightarrow \mu(x) = \lambda(x) \text{and} \psi_M(x) = \psi_N(x), \forall x \in X$ .
(3) $A \sqcap B \Leftrightarrow \mu(x) \wedge \lambda(x) \text{and} \psi_M(x) \wedge \psi_N(x), \forall x \in X$.
(4) $A \sqcup B \Leftrightarrow \mu(x) \vee \lambda(x) \text{and} \psi_M(x) \vee \psi_N(x), \forall x \in X$.

**Definition 3.6.** The pair $(X, lim)$ is called a *soft $\tilde{L}$-fuzzy convergence structure*, where $lim : \mathbb{F}(X) \to \tilde{L}^X$ provided :

(SFC1) $\forall \mathfrak{F} \in \mathbb{F}(X), lim\ \mathfrak{F} = \sqcap_{\mathfrak{G} \in \mathbb{P}_m(\mathfrak{F})}\ lim\ \mathfrak{G}$.
(SFC2) $\forall \mathfrak{F}, \mathfrak{G} \in \mathbb{F}_p(X)$, when $\mathfrak{F} \sqsubseteq \mathfrak{G} \Rightarrow lim\ \mathfrak{G} \sqsubseteq lim\ \mathfrak{F}$.
(SFC3) $\forall x \in X, 0 < \alpha < 1, lim\ (\widetilde{\alpha 1_x, \{x\}}) \sqsupseteq (0_X, 0_X)$, where $\alpha 1_x = \alpha \wedge 1_x$.
(SFC4) $lim(\widetilde{1_X, X}) = (1_X, 1_X)$

**Definition 3.7.** Let $(X, lim)$, $(Y, lim)$ be the soft $\tilde{L}$-fuzzy convergence structures. Let $\mathfrak{F} \in \mathbb{F}(X)$. If $f$ is a function from $X$ to $Y$ and $lim\mathfrak{F} \in \tilde{L}^X$ , then the *image* of $lim\mathfrak{F}$, $f(lim\mathfrak{F})$ is the soft $\tilde{L}$-fuzzy set in Y defined by

$$f(lim\mathfrak{F})(y) = sup_{x \in f^{-1}(y)}\{lim\mathfrak{F}(x)\}$$

**Definition 3.8.** Let $(X, lim)$, $(Y, lim)$ be the soft $\tilde{L}$-fuzzy convergence structures. Let $\mathfrak{G} \in \mathbb{F}(Y)$. If $f$ is a function from $X$ to $Y$ and $lim\mathfrak{G} \in \tilde{L}^Y$, then the *inverse image* of $lim\mathfrak{G}$, $f^{-1}(lim\mathfrak{G})$ is the soft $\tilde{L}$-fuzzy set in Y defined by

$$f^{-1}(lim\mathfrak{G}) = lim\mathfrak{G} \circ f$$

**Note:** Analogously, $sup_{i \in J}\{lim\mathfrak{F}_i\}$, $inf_{i \in J}\{lim\mathfrak{F}_i\}$ $\sqcup_{i \in J} lim\mathfrak{F}_i$, $\sqcap_{i \in J} lim\mathfrak{F}_i$ e.t.c., are defined in usual way as in L-fuzzy sets.

**Definition 3.9.** Let $(X, lim)$ be a soft $\tilde{L}$-fuzzy convergence structure. Then, the *interior operator*, $int : \tilde{L}^X \to \tilde{L}^X$ is defined for $\mathfrak{F} \in \mathbb{F}(X)$ as,

$$int(lim\mathfrak{F}) = \sqcup\{lim\mathfrak{G} \in \tilde{L}^X : lim\mathfrak{F} \sqsupseteq lim\mathfrak{G}, \mathfrak{G} \in \mathbb{F}_p(X)\}$$

**Definition 3.10.** Let $(X, lim)$ be a soft $\tilde{L}$-fuzzy convergence structure. Let $\mathfrak{F} \in \mathbb{F}(X)$. Let $lim\mathfrak{F} \in \tilde{L}^X$. Then, the *soft $\tilde{L}$-fuzzy lim-convergence topology* is defined by

$$\tau_{lim} = \{lim\mathfrak{F} : int(lim\mathfrak{F}) = lim\mathfrak{F}, \mathfrak{F} \in \mathbb{F}_p(X)\}$$

Now, the pair $(X, \tau_{lim})$ is said to be a *soft $\tilde{L}$-fuzzy lim-convergence topological space.*

The member of $\tau_{lim}$ is called as a soft $\tilde{L}$-fuzzy lim-open set and its complement is defined as

$$(lim\mathfrak{F})' = lim(\widetilde{1_X, X}) - lim\mathfrak{F}$$

which is called as a *soft $\tilde{L}$-fuzzy lim-closed set.*

**Definition 3.11.** Let $(X, \tau_{lim})$ be a soft $\tilde{L}$-fuzzy *lim*-convergence topological space. Let $\mathfrak{F} \in \mathbb{F}(X)$. Let $lim\mathfrak{F} \in \tilde{L}^X$. Then, the *soft $\tilde{L}$-fuzzy* lim *-closure* and *soft $\tilde{L}$-fuzzy* lim-*interior* of a soft $\tilde{L}$-fuzzy set, $lim\mathfrak{F}$ in $X$ will be defined as

$$S\tilde{L}F\text{-}int(lim\mathfrak{F}) = \sqcup\{lim\mathfrak{G} \in \tilde{L}^X : lim\mathfrak{G} \text{ is a soft } \tilde{L} \text{ -fuzzy lim-open set}, \\ lim\mathfrak{F} \sqsupseteq lim\mathfrak{G}, \mathfrak{G} \in \mathbb{F}_p(X)\}$$
$$S\tilde{L}F\text{-}cl(lim\mathfrak{F}) = \sqcap\{lim\mathfrak{G} \in \tilde{L}^X : lim\mathfrak{G} \text{ is a soft } \tilde{L} \text{ -fuzzy lim-closed set}, \\ lim\mathfrak{F} \sqsubseteq lim\mathfrak{G}, \mathfrak{G} \in \mathbb{F}_p(X)\}$$

**Proposition 3.12.** *For any* $\mathfrak{F} \in \mathbb{F}(X)$*, we have*
(a) $S\tilde{L}F\text{-}cl((lim\mathfrak{F})') = (S\tilde{L}F\text{-}int(lim\mathfrak{F}))'$
(b) $S\tilde{L}F\text{-}int((lim\mathfrak{F})') = (S\tilde{L}F\text{-}cl(lim\mathfrak{F}))'$

*Proof.* (a) $S\tilde{L}F - cl((lim\mathfrak{F})') = S\tilde{L}F - cl(lim(\widetilde{1_X, X}) - lim\mathfrak{F})$
$= \sqcap\{lim(\widetilde{1_X, X}) - lim\mathfrak{G} \in \tilde{L}^X : lim(\widetilde{1_X, X}) - lim\mathfrak{G}$ is a soft $\tilde{L}$-fuzzy lim-closed set $lim(\widetilde{1_X, X}) - lim\mathfrak{F} \sqsubseteq lim(\widetilde{1_X, X}) - lim\mathfrak{G}, \mathfrak{G} \in \mathbb{F}_p(X)\}$
$= lim(\widetilde{1_X, X}) - \sqcup\{lim\mathfrak{G} \in \tilde{L}^X : lim\mathfrak{G}$ is a soft $\tilde{L}$-fuzzy lim-open set, $lim\mathfrak{F} \sqsupseteq lim\mathfrak{G}, \mathfrak{G} \in \mathbb{F}_p(X)\}$
$= lim(\widetilde{1_X, X}) - S\tilde{L}F - int(lim\mathfrak{F})$.
(b) Similar proof of (a). □

**Note:** If $\mathfrak{F}, \mathfrak{G} \in \mathbb{F}(X)$, and $lim\mathfrak{F}, lim\mathfrak{G} \in \tilde{L}^X$, $lim\mathfrak{F} \sqsubseteq lim\mathfrak{G}$ is defined analogously as in L-fuzzy set in usual way.

**Definition 3.13.** Let $(X, \tau_{lim})$ be a soft $\tilde{L}$-fuzzy *lim*-convergence topological space and A be a subset of X. If $\mathfrak{F} \in \mathbb{F}_p(X)$ and $(lim\mathfrak{F})/A \in \tilde{L}^A$, then

$$\tau_{lim/A} = \{(lim\mathfrak{F})/A : lim\mathfrak{F} \in \tau_{lim}\}$$

is called as a *soft* $\tilde{L}$*-fuzzy* lim*-convergence subspace topology.* Now, the pair $(A, \tau_{lim/A})$ is called as a *soft* $\tilde{L}$*-fuzzy* lim*-convergence subspace* of $(X, \tau_{lim})$.

**Definition 3.14.** Let $(X, lim)$ be a soft $\tilde{L}$-fuzzy convergence structure. Let $\mathfrak{F} \in \mathbb{F}(X)$. Let $lim\mathfrak{F} \in \tilde{L}^X$. Then, the *soft* $\tilde{L}$*-fuzzy real line* $\tilde{L}^{\mathbb{R}}$ i.e. $\mathbb{R}(L \times L)$is the set of all monotone decreasing element $lim\mathfrak{F} \in \tilde{L}^{\mathbb{R}}$ satisfying

$$\sqcup\{lim\ \mathfrak{F}(t) : t \in \mathbb{R}\} = (1, 1)$$
$$\sqcap\{lim\ \mathfrak{F}(t) : t \in \mathbb{R}\} = (0, 0)$$

after the identification of $lim\ \mathfrak{F}$, $lim\ \mathfrak{G} \in \tilde{L}^{\mathbb{R}}$ and $\mathfrak{F}, \mathfrak{G} \in \mathbb{F}(X)$ iff

$$lim\ \mathfrak{F}(t-) = lim\ \mathfrak{G}(t-)$$
$$lim\ \mathfrak{F}(t+) = lim\ \mathfrak{G}(t+)$$

for all $t \in \mathbb{R}$, where,

$$lim\ \mathfrak{F}(t-) = \sqcap_{s<t}\ lim\mathfrak{F}(s) = lt_{s\to t-}\ lim\mathfrak{F}(s).$$
$$lim\ \mathfrak{F}(t+) = \sqcup_{s>t}\ lim\mathfrak{F}(s) = lt_{s\to t+}\ lim\mathfrak{F}(s).$$

**Definition 3.15.** Let $(X, lim)$ be a soft $\tilde{L}$-fuzzy convergence structure. Let $\mathfrak{F} \in \mathbb{F}(X)$. Let $lim\mathfrak{F} \in \tilde{L}^X$. The *natural soft* $\tilde{L}$*-fuzzy* lim*-convergence topology* on $\mathbb{R}(L \times L)$ is generated from the sub-basis $\{L_t, R_t : t \in \mathbb{R}\}$, where, $L_t, R_t : \mathbb{R} \to L \times L$ and $L_t(lim\mathfrak{F}) = (lim\mathfrak{F}(t-))' {=} (1, 1) - lim\mathfrak{F}(t-)$ and $R_t(lim\mathfrak{F}) = lim\mathfrak{F}(t+)$, for all $lim\mathfrak{F} \in \tilde{L}^{\mathbb{R}}$. This topology is called as the *usual topology* for $\mathbb{R}(L \times L)$.

$\mathcal{L} = \{L_t : t \in \mathbb{R}\} \cup \{(0_X, 0_X), (1_X, 1_X)\}$ and $\mathcal{R} = \{R_t : t \in \mathbb{R}\} \cap \{(0_X, 0_X), (1_X, 1_X)\}$ are called the *left and right hand I-topologies* respectively.

**Definition 3.16.** A *partial order on* $\mathbb{R}(L \times L)$ is defined by $[lim\mathfrak{F}] \sqsubseteq [lim\mathfrak{G}]$ iff $lim\ \mathfrak{F}(t-) \sqsubseteq lim\ \mathfrak{G}(t-)$ and $lim\ \mathfrak{F}(t+) \sqsubseteq lim\ \mathfrak{G}(t+)$, for all $t \in \mathbb{R}$ and $\mathfrak{F}, \mathfrak{G} \in \mathbb{F}(X)$.

**Definition 3.17.** Let $(X, lim)$ be a soft $\tilde{L}$-fuzzy convergence structure. The *soft* $\tilde{L}$*-fuzzy unit interval* $I(L \times L)$ is a subset of $\mathbb{R}(L \times L)$ such that $[lim\mathfrak{F}] \in I(L \times L)$ i.e. $[lim\mathfrak{F}] \in \tilde{L}^I$, if

$$lim\mathfrak{F}(t) = (1,1) \text{ for } t < 0,\ t \in \mathbb{R}$$
$$lim\mathfrak{F}(t) = (0,0) \text{ for } t > 1,\ t \in \mathbb{R}$$

It is equipped with the soft $\tilde{L}$- fuzzy $lim$-convergence subspace topology.

**Definition 3.18.** Let $(X, \tau_{lim})$ be a soft $\tilde{L}$-fuzzy $lim$-convergence topological space. A soft $\tilde{L}$-fuzzy set, $lim\mathfrak{F}$ is said to be a *soft* $\tilde{L}$*-fuzzy* $\alpha^*$-lim-*open set* (in short., $S\tilde{L}F\alpha^*$-lim$OS$.), if

$$S\tilde{L}F\text{-}int(lim\mathfrak{F}) = S\tilde{L}F\text{-}int(S\tilde{L}F\text{-}cl(S\tilde{L}F\text{-}int(lim\mathfrak{F}))), \text{ for each } \mathfrak{F} \in \mathbb{F}_p(X).$$

The complement of a soft $\tilde{L}$-fuzzy $\alpha^*$-*lim*-open set is called as *a soft* $\tilde{L}$*-fuzzy* $\alpha^*$-lim-*closed set.* It is denoted by **S$\tilde{L}$F$\alpha^*$-*lim*CS**.

**Definition 3.19.** Let $(X, \tau_{lim})$ be a soft $\tilde{L}$-fuzzy $lim$-convergence topological space. A soft $\tilde{L}$-fuzzy set, $lim\mathfrak{F}$ is said to be *a soft* $\tilde{L}$*-fuzzy C*-lim-*open set*(in short., $S\tilde{L}Fc$-lim$OS$.), if

$$lim\mathfrak{F} = lim\mathfrak{G}_1 \sqcap lim\mathfrak{G}_2,\ \mathfrak{F} \in \mathbb{F}(X),\ \mathfrak{G}_1, \mathfrak{G}_2 \in \mathbb{F}_p(X).$$

where, $lim\mathfrak{G}_1$ is a soft $\tilde{L}$-fuzzy $lim$-open set and $lim\mathfrak{G}_2$ is a soft $\tilde{L}$-fuzzy $\alpha^*$-*lim*-open set

Now, the complement of a soft $\tilde{L}$-fuzzy C-*lim*-open set is called as *a soft* $\tilde{L}$*-fuzzy C*-lim-*closed set.* It is denoted by **S$\tilde{L}$Fc-*lim*CS**.

**Definition 3.20.** Let $(X, \tau_{lim})$ be a soft $\tilde{L}$-fuzzy $lim$-convergence topological space. Let $\mathfrak{F} \in \mathbb{F}(X)$. Let $lim\mathfrak{F} \in \tilde{L}^X$. Then, the *soft* $\tilde{L}$*-fuzzy C*-lim-*closure* and *soft* $\tilde{L}$*-fuzzy C*-lim-*interior* of a soft $\tilde{L}$-fuzzy set $lim\mathfrak{F}$ in $X$ will be defined as

$$S\tilde{L}FC\text{-}int(lim\mathfrak{F}) = \sqcup\{lim\mathfrak{G} \in \tilde{L}^X : lim\mathfrak{G} \text{ is a soft } \tilde{L}\text{-fuzzy C-}lim\text{-open set and } lim\mathfrak{F} \sqsupseteq lim\mathfrak{G}, \mathfrak{G} \in \mathbb{F}_p(X)\}$$
$$S\tilde{L}FC\text{-}cl(lim\mathfrak{F}) = \sqcap\{lim\mathfrak{G} \in \tilde{L}^X : lim\mathfrak{G} \text{ is a soft } \tilde{L}\text{-fuzzy C-}lim\text{-closed set and } lim\mathfrak{F} \sqsubseteq lim\mathfrak{G}, \mathfrak{G} \in \mathbb{F}_p(X)\}$$

**Remark 3.21.**
(1) $S\tilde{L}F\text{-}int(lim\mathfrak{F}) \sqsubseteq lim\mathfrak{F} \sqsubseteq S\tilde{L}F\text{-}cl(lim\mathfrak{F})$
(2) $S\tilde{L}FC\text{-}int(lim\mathfrak{F}) \sqsubseteq lim\mathfrak{F} \sqsubseteq S\tilde{L}FC\text{-}cl(lim\mathfrak{F})$

**Proposition 3.22.** *For any* $\mathfrak{F} \in \mathbb{F}(X)$*, we have*
(a) $S\tilde{L}FC\text{-}cl((lim\mathfrak{F})') = (S\tilde{L}FC\text{-}int(lim\mathfrak{F}))'$
(b) $S\tilde{L}FC\text{-}int((lim\mathfrak{F})') = (S\tilde{L}FC\text{-}cl(lim\mathfrak{F}))'$

*Proof.* (a)

$$\begin{aligned}
&S\tilde{L}FC\text{-}cl((lim\mathfrak{F})') = S\tilde{L}FC\text{-}cl(lim(\widetilde{1_X, X}) - lim\mathfrak{F}) \\
&= \sqcap\{lim(\widetilde{1_X, X}) - lim\mathfrak{G} \in \tilde{L}^X : lim(\widetilde{1_X, X}) - lim\mathfrak{G} \text{ is a soft } \tilde{L}\text{-fuzzy} \\
&\qquad \text{C-lim-closed set}, lim(\widetilde{1_X, X}) - lim\mathfrak{F} \sqsubseteq lim(\widetilde{1_X, X}) - lim\mathfrak{G}, \mathfrak{G} \in \mathbb{F}_p(X)\} \\
&= lim(\widetilde{1_X, X}) - \sqcup\{lim\mathfrak{G} \in \tilde{L}^X : lim\mathfrak{G} \text{ is a soft } \tilde{L}\text{-fuzzy C-lim-open set}, \\
&\qquad lim\mathfrak{F} \sqsupseteq lim\mathfrak{G}, \mathfrak{G} \in \mathbb{F}_p(X)\} \\
&= lim(\widetilde{1_X, X}) - S\tilde{L}FC\text{-}int(lim\mathfrak{F}).
\end{aligned}$$

(b) Similar proof of (a). □

## 4. Soft $\tilde{L}$-fuzzy C-*lim*-convergence extremally disconnected space

**Definition 4.1.** Let $(X, \tau_{lim})$ be a soft $\tilde{L}$-fuzzy *lim*-convergence topological space. If the soft $\tilde{L}$-fuzzy C-*lim*-closure of a soft $\tilde{L}$-fuzzy C-*lim*-open set is soft $\tilde{L}$-fuzzy C-*lim*-open, then $(X, \tau_{lim})$ is said to be soft $\tilde{L}$-fuzzy C-lim-convergence extremally disconnected space.

**Proposition 4.2.** *For any soft $\tilde{L}$-fuzzy lim-convergence topological space $(X, \tau_{lim})$, the following are equivalent:*

(a) *$(X, \tau_{lim})$ is a soft $\tilde{L}$-fuzzy C-lim-convergence extremally disconnected space.*

(b) *For each soft $\tilde{L}$-fuzzy C-lim-closed set $lim\mathfrak{F}$, $S\tilde{L}FC\text{-}int(lim\mathfrak{F})$ is a soft $\tilde{L}$-fuzzy C-lim-closed set.*

(c) *For each soft $\tilde{L}$-fuzzy C-lim-open set $lim\mathfrak{F}$, we have $S\tilde{L}FC\text{-}int(S\tilde{L}FC\text{-}cl(lim\mathfrak{F})) = S\tilde{L}FC\text{-}cl(lim\mathfrak{F})$.*

(d) *For each pair of soft $\tilde{L}$-fuzzy C-lim-open sets $lim\mathfrak{F}$ and $lim\mathfrak{G}$ in $(X, \tau_{lim})$ with $S\tilde{L}FC\text{-}int(lim(\widetilde{1_X, X}) - lim\mathfrak{F}) = lim\mathfrak{G}$, we have $lim(\widetilde{1_X, X}) - S\tilde{L}FC\text{-}cl(lim\mathfrak{F}) = S\tilde{L}FC\text{-}cl(lim\mathfrak{G})$.*

*Proof.* $(a) \Rightarrow (b)$: Let $lim\mathfrak{F}$ be a soft $\tilde{L}$-fuzzy C-*lim*-closed set. Now, $(lim\mathfrak{F})'$ is a soft $\tilde{L}$-fuzzy C-*lim*-open set. By (a), $S\tilde{L}FC\text{-}cl((lim\mathfrak{F})')$ is a soft $\tilde{L}$-fuzzy C-*lim*-open set. Now,

$$\begin{aligned}
S\tilde{L}FC\text{-}cl((lim\mathfrak{F})') &= S\tilde{L}FC\text{-}cl(lim(\widetilde{1_X, X}) - lim\mathfrak{F}) \\
&= lim(\widetilde{1_X, X}) - S\tilde{L}FC\text{-}int(lim\mathfrak{F}).
\end{aligned}$$

This implies that, $S\tilde{L}FC\text{-}int(lim\mathfrak{F})$ is a soft $\tilde{L}$-fuzzy C-*lim*-closed set.

$(b) \Rightarrow (c)$: Let $lim\mathfrak{F}$ be a soft $\tilde{L}$-fuzzy C-*lim*-open set. Then, $(lim\mathfrak{F})'$ is a soft $\tilde{L}$-fuzzy C-*lim*-closed set. By (b), $S\tilde{L}FC\text{-}int((lim\mathfrak{F})')$ is a soft $\tilde{L}$-fuzzy C-*lim*-closed set. Now,

$$\begin{aligned}&lim(\widetilde{1_X, X}) - S\tilde{L}FC\text{-}int(S\tilde{L}FC\text{-}cl(lim\mathfrak{F}))\\&= S\tilde{L}FC\text{-}cl(S\tilde{L}FC\text{-}int(lim(\widetilde{1_X, X}) - lim\mathfrak{F}))\\&= S\tilde{L}FC\text{-}int(lim(\widetilde{1_X, X}) - lim\mathfrak{F})\\&= lim(\widetilde{1_X, X}) - S\tilde{L}FC\text{-}cl(lim\mathfrak{F})\end{aligned}$$

Hence, $S\tilde{L}FC\text{-}int(S\tilde{L}FC\text{-}cl(lim\mathfrak{F})) = S\tilde{L}FC\text{-}cl(lim\mathfrak{F})$.

$(c) \Rightarrow (d)$: Let $lim\mathfrak{F}$, $lim\mathfrak{G}$ be two soft $\tilde{L}$-fuzzy C-*lim*-open sets such that

$$S\tilde{L}FC\text{-}int(lim(\widetilde{1_X, X}) - lim\mathfrak{F}) = lim\mathfrak{G}.$$

By (c), we have $S\tilde{L}FC\text{-}int(S\tilde{L}FC\text{-}cl(lim\mathfrak{F})) = S\tilde{L}FC\text{-}cl(lim\mathfrak{F})$. Now,

$$\begin{aligned}&lim(\widetilde{1_X, X}) - S\tilde{L}FC\text{-}int(S\tilde{L}FC\text{-}cl(lim\mathfrak{F})) = lim(\widetilde{1_X, X}) - S\tilde{L}FC\text{-}cl(lim\mathfrak{F})\\&= S\tilde{L}FC\text{-}int((lim\mathfrak{F})') = lim\mathfrak{G}.\end{aligned}$$

This implies that $S\tilde{L}FC\text{-}cl(S\tilde{L}FC\text{-}int(lim(\widetilde{1_X, X}) - lim\mathfrak{F})) = lim\mathfrak{G}$. It follows that $S\tilde{L}FC\text{-}cl(lim\mathfrak{G}) = lim\mathfrak{G}$. This implies that

$$\begin{aligned}&lim(\widetilde{1_X, X}) - S\tilde{L}FC\text{-}cl(lim\mathfrak{F}) = S\tilde{L}FC\text{-}int(lim(\widetilde{1_X, X}) - lim\mathfrak{F})\\&= lim\mathfrak{G} = S\tilde{L}FC\text{-}cl(lim\mathfrak{G}).\end{aligned}$$

$(d) \Rightarrow (a)$: Let $lim\mathfrak{F}$ be any soft $\tilde{L}$-fuzzy C-*lim*-open set. Consider another soft $\tilde{L}$-fuzzy C-*lim*-open set $lim\mathfrak{G}$, with $S\tilde{L}FC\text{-}int(lim(\widetilde{1_X, X}) - lim\mathfrak{F}) = lim\mathfrak{G}$. By (d), $(S\tilde{L}FC\text{-}cl(lim\mathfrak{F}))' = S\tilde{L}FC\text{-}cl(lim\mathfrak{G})$. This implies that $S\tilde{L}FC\text{-}cl(lim\mathfrak{F}) = (S\tilde{L}FC\text{-}cl(lim\mathfrak{G}))'$. It follows that $S\tilde{L}FC\text{-}cl(lim\mathfrak{F})$ is a soft $\tilde{L}$-fuzzy C-*lim*-open set. Hence, $(X, \tau_{lim})$ is soft $\tilde{L}$-fuzzy C-*lim*-convergence extremally disconnected space. □

**Proposition 4.3.** *Let $(X, \tau_{lim})$ be a soft $\tilde{L}$-fuzzy lim-convergence topological space. Then, $(X, \tau_{lim})$ is soft $\tilde{L}$-fuzzy C-lim-convergence extremally disconnected space iff for each soft $\tilde{L}$-fuzzy C-lim-open set, $lim\mathfrak{F}$ and soft $\tilde{L}$-fuzzy C-lim-closed set, $lim\mathfrak{G}$ such that $lim\mathfrak{F} \sqsubseteq lim\mathfrak{G}$, we have $S\tilde{L}FC\text{-}cl(lim\mathfrak{F}) \sqsubseteq S\tilde{L}FC\text{-}int(lim\mathfrak{G})$.*

*Proof.* Suppose $(X, \tau_{lim})$ is a soft $\tilde{L}$-fuzzy C-*lim*-convergence extremally disconnected space. Let $lim\mathfrak{F}$ be any soft $\tilde{L}$-fuzzy C-*lim*-open set and $lim\mathfrak{G}$ be any soft $\tilde{L}$-fuzzy C-*lim*-closed set. Then, by (b) of Proposition 4.2, $S\tilde{L}FC\text{-}int(lim\mathfrak{G})$ is soft $\tilde{L}$-fuzzy C-*lim*-closed. Since $lim\mathfrak{F}$ is a soft $\tilde{L}$-fuzzy C-*lim*-open set and $lim\mathfrak{F} \sqsubseteq lim\mathfrak{G}$, it follows that, $lim\mathfrak{F} \sqsubseteq S\tilde{L}FC\text{-}int(lim\mathfrak{G})$. Thus, it follows that, $S\tilde{L}FC\text{-}cl(lim\mathfrak{F}) \sqsubseteq S\tilde{L}FC\text{-}cl(S\tilde{L}FC\text{-}int(lim\mathfrak{G})) = S\tilde{L}FC\text{-}int(lim\mathfrak{G})$.

Conversely, let $lim\mathfrak{G}$ be a soft $\tilde{L}$-fuzzy C-*lim*-closed set. Then, $S\tilde{L}FC\text{-}int(lim\mathfrak{G})$ is a $S\tilde{L}FC\text{-}lim$ open set. Also, $S\tilde{L}FC\text{-}int(lim\mathfrak{G}) \sqsubseteq lim\mathfrak{G}$. Now, by assumption, it follows that, $S\tilde{L}FC\text{-}cl(S\tilde{L}FC\text{-}int(lim\mathfrak{G})) \sqsubseteq S\tilde{L}FC\text{-}int(lim\mathfrak{G})$. This implies that, $S\tilde{L}FC\text{-}cl(S\tilde{L}FC\text{-}int(lim\mathfrak{G})) = S\tilde{L}FC\text{-}int(lim\mathfrak{G})$. Thus, $S\tilde{L}FC\text{-}int(lim\mathfrak{G})$ is a soft

$\tilde{L}$-fuzzy C-*lim*-closed set. Hence, by the Proposition 4.2, we have $(X, \tau_{lim})$ is a soft $\tilde{L}$-fuzzy C-*lim*-convergence extremally disconnected space. □

**Definition 4.4.** A soft $\tilde{L}$-fuzzy set which is both soft $\tilde{L}$-fuzzy C-*lim*-open and soft $\tilde{L}$-fuzzy C-*lim*-closed set is called as a soft $\tilde{L}$-fuzzy C-*lim*-clopen set. It is denoted by **S$\tilde{L}$Fc-*lim*COS**.

**Definition 4.5.** A soft $\tilde{L}$-fuzzy *lim*-convergence topological space, $(X, \tau_{lim})$ is said to have *property* $\nabla$, if the union of any family of C-*lim*-open sets is C-*lim*-open.

**Remark 4.6.** Let $(X, \tau_{lim})$ be a soft $\tilde{L}$-fuzzy C-*lim*-convergence extremally disconnected space. Let $(X, \tau_{lim})$ possess the property $\nabla$. Let $\{lim\mathfrak{F}_i, lim\mathfrak{G}_j : i, j \in \mathbb{N}\}$ be a collection such that each $lim\mathfrak{F}_i$'s are $S\tilde{L}Fc\text{-}limOS$ and each $lim\mathfrak{G}_j$'s are $S\tilde{L}Fc\text{-}limCS$. Let $lim\mathfrak{F}, lim\mathfrak{G}$ be the $S\tilde{L}FC\text{-}lim$ open set and $S\tilde{L}FC\text{-}lim$ closed set respectively. If $lim\mathfrak{F}_i \sqsubseteq lim\mathfrak{F} \sqsubseteq lim\mathfrak{G}_j$ and $lim\mathfrak{F}_i \sqsubseteq lim\mathfrak{G} \sqsubseteq lim\mathfrak{G}_j$, for all $i, j \in \mathbb{N}$, then there exists a soft $\tilde{L}$-fuzzy C-*lim*-clopen set, $lim\mathfrak{M}$ such that $S\tilde{L}FC\text{-}cl(lim\mathfrak{F}_i) \sqsubseteq lim\mathfrak{M} \sqsubseteq S\tilde{L}FC\text{-}int(lim\mathfrak{G}_j)$, for all $i, j \in \mathbb{N}$.

*Proof.* By the Proposition 4.3,

$$\begin{aligned} S\tilde{L}FC\text{-}cl(lim\mathfrak{F}_i) &\sqsubseteq S\tilde{L}FC\text{-}cl(lim\mathfrak{F}) \sqcap S\tilde{L}FC\text{-}int(lim\mathfrak{G}) \\ &\sqsubseteq S\tilde{L}FC\text{-}int(lim\mathfrak{G}_j) \end{aligned}$$

for all $i, j \in \mathbb{N}$. Therefore, using the hypothesis,

$$lim\mathfrak{M} = S\tilde{L}FC\text{-}cl(lim\mathfrak{F}) \sqcap S\tilde{L}FC\text{-}int(lim\mathfrak{G})$$

is a soft $\tilde{L}$-fuzzy C-*lim*-clopen set satisfying the required condition. □

**Proposition 4.7.** *Let $(X, \tau_{lim})$ be a soft $\tilde{L}$-fuzzy C-lim-convergence extremally disconnected space. Let $(X, \tau_{lim})$ possess the property $\nabla$. Let $\{lim\mathfrak{F}_q\}_{q\in\mathbb{Q}}$ and $\{lim\mathfrak{G}_q\}_{q\in\mathbb{Q}}$ be the monotone increasing collections of soft $\tilde{L}$-fuzzy C-lim-open sets and soft $\tilde{L}$-fuzzy C-lim-closed sets of $(X, \tau_{lim})$.($\mathbb{Q}$ is the set of all rational numbers). If $lim\mathfrak{F}_{q_1} \sqsubseteq lim\mathfrak{G}_{q_2}$, whenever $q_1 < q_2$ $(q_1, q_2 \in \mathbb{Q})$, then, there exists a monotone increasing collection $\{lim\mathfrak{H}_q\}_{q\in\mathbb{Q}}$ of soft $\tilde{L}$-fuzzy C-lim-clopen sets of $(X, \tau_{lim})$ such that $S\tilde{L}FC\text{-}cl(lim\mathfrak{F}_{q_1}) \sqsubseteq lim\mathfrak{H}_{q_2}$ and $lim\mathfrak{H}_{q_1} \sqsubseteq S\tilde{L}FC\text{-}int(lim\mathfrak{G}_{q_2})$ whenever $q_1 < q_2$.*

*Proof.* Let us arrange into a sequence $\{q_n\}$ of rational numbers without repetitions. For every $n \geq 2$, define inductively a collection $\{lim\mathfrak{H}_{q_i} : 1 \leq i < n\} \subseteq \tilde{L}^X$ such that By Proposition 4.3, the countable collections $\{S\tilde{L}FC\text{-}cl(lim\mathfrak{F}_q)\}_{q\in\mathbb{Q}}$ and $\{S\tilde{L}FC\text{-}int(lim\mathfrak{G}_q)\}_{q\in\mathbb{Q}}$ satisfying $S\tilde{L}FC\text{-}cl(lim\mathfrak{F}_{q_1}) \sqsubseteq S\tilde{L}FC\text{-}int(lim\mathfrak{G}_{q_2})$, if $q_1 < q_2$ $(q_1, q_2 \in \mathbb{Q})$. By the Remark:4.6, there exists $S\tilde{L}FC\text{-}lim$ clopen set, $lim\mathfrak{M}$ such that $S\tilde{L}FC\text{-}cl(lim\mathfrak{F}_{q_1}) \sqsubseteq lim\mathfrak{M} \sqsubseteq S\tilde{L}FC\text{-}int(lim\mathfrak{G}_{q_2})$. By setting $lim\mathfrak{H}_{q_1} = lim\mathfrak{M}$, we get $(S_2)$.

Assume that soft $\tilde{L}$-fuzzy sets $lim\mathfrak{H}_{q_i}$ (already defined), for $i < n$ and satisfy $(S_n)$. Define

$$\begin{aligned} \Phi &= \sqcup\{lim\mathfrak{H}_{q_i} : i < n, q_i < q_n\} \sqcup lim\mathfrak{F}_{q_n} \\ \Omega &= \sqcap\{lim\mathfrak{H}_{q_j} : j < n, q_j > q_n\} \sqcap lim\mathfrak{G}_{q_n} \end{aligned}$$

Then, we have, $S\tilde{L}FC\text{-}cl(lim\mathfrak{H}_{q_i}) \sqsubseteq S\tilde{L}FC\text{-}cl(\Phi) \sqsubseteq S\tilde{L}FC\text{-}int(lim\mathfrak{H}_{q_j})$ and $S\tilde{L}FC\text{-}cl(lim\mathfrak{H}_{q_i}) \sqsubseteq S\tilde{L}FC\text{-}int(\Omega) \sqsubseteq S\tilde{L}FC\text{-}int(lim\mathfrak{H}_{q_j})$, whenever $q_i < q_n < q_j$ $(i, j < n)$, as well as $lim\mathfrak{F}_q \sqsubseteq S\tilde{L}FC\text{-}cl(\Phi) \sqsubseteq lim\mathfrak{G}_{q'}$ and $lim\mathfrak{F}_q \sqsubseteq S\tilde{L}FC\text{-}int(\Omega) \sqsubseteq lim\mathfrak{G}_{q'}$, whenever $q < q_n < q'$. This shows that the countable collections $\{lim\mathfrak{H}_{q_i} : i < n, q_i < q_n\} \bigcup \{lim\mathfrak{F}_q : q < q_n\}$ and $\{lim\mathfrak{H}_{q_j} : j < n, q_j > q_n\} \bigcup \{lim\mathfrak{G}_{q'} : q' > q_n\}$ together with $\Phi$ and $\Omega$, fulfil all the conditions of the Remark:4.6. Hence, there exists a $S\tilde{L}FC\text{-}lim$ clopen set, $lim\mathfrak{M}_n$ such that $S\tilde{L}FC\text{-}cl(lim\mathfrak{M}_n) \sqsubseteq lim\mathfrak{G}_q$ if $q_n < q$, and $lim\mathfrak{F}_q \sqsubseteq S\tilde{L}FC\text{-}int(lim\mathfrak{M}_n)$ if $q < q_n$. Also, $S\tilde{L}FC\text{-}cl(lim\mathfrak{H}_{q_i}) \sqsubseteq S\tilde{L}FC\text{-}int(lim\mathfrak{M}_n)$ if $q_i < q_n$ and $S\tilde{L}FC\text{-}cl(lim\mathfrak{M}_n) \sqsubseteq S\tilde{L}FC\text{-}int(lim\mathfrak{H}_{q_j})$ if $q_n < q_j$, where $1 \leq i, j \leq n-1$. Now setting $lim\mathfrak{H}_{q_n} = lim\mathfrak{M}_n$, we obtain the soft $\tilde{L}$-fuzzy sets $lim\mathfrak{H}_{q_1}, lim\mathfrak{H}_{q_2}, ....lim\mathfrak{H}_{q_n}$ that satisfy $(S_{n+1})$. Therefore, the collection $\{lim\mathfrak{H}_{q_i} : i = 1, 2, 3, ...\}$ has the required property. This completes the proof. ☐

## 5. Characterizations of soft $\tilde{L}$-fuzzy C-*lim*-convergence extremally disconnected space

**Definition 5.1.** Let $(X, \tau_{lim})$ and $(Y, \sigma_{lim})$ be two soft $\tilde{L}$-fuzzy *lim*-convergence topological spaces. Let $f : (X, \tau_{lim}) \to (Y, \sigma_{lim})$ be a function. Let $\mathfrak{F} \in \mathbb{F}_p(Y)$ Then, $f$ is said to be *soft $\tilde{L}$-fuzzy C-*lim*-convergence continuous function* if, for every soft $\tilde{L}$-fuzzy *lim*-open set, $lim\mathfrak{F}$ in $(Y, \sigma_{lim})$, there exists a soft $\tilde{L}$-fuzzy C-*lim*-open set $f^{-1}(lim\mathfrak{F})$ of $(X, \tau_{lim})$.

Equivalently, if, for every soft $\tilde{L}$-fuzzy *lim*-closed set, $lim\mathfrak{F}$ in $(Y, \sigma_{lim})$, there exists a soft $\tilde{L}$-fuzzy C-*lim*-closed set $f^{-1}(lim\mathfrak{F})$ of $(X, \tau_{lim})$.

**Proposition 5.2.** *Let $(X, \tau_{lim})$ and $(Y, \sigma_{lim})$ be two soft $\tilde{L}$-fuzzy lim-convergence topological spaces. A function $f : (X, \tau_{lim}) \to (Y, \sigma_{lim})$ is a soft $\tilde{L}$-fuzzy C-*lim*-convergence continuous function iff*

$$f(S\tilde{L}FC\text{-}cl(lim\mathfrak{F})) \sqsubseteq S\tilde{L}Fcl(f(lim\mathfrak{F}))$$

*for all $lim\mathfrak{F} \in \tilde{L}^X$, $\mathfrak{F} \in \mathbb{F}(X)$.*

*Proof.* Suppose that $f$ is a soft $\tilde{L}$-fuzzy C-*lim*-convergence continuous function. Let $\mathfrak{F} \in \mathbb{F}(X)$. Let $lim\mathfrak{F} \in \tilde{L}^X$. Then $f(lim\mathfrak{F}) \in \tilde{L}^Y$. By the hypothesis,

$$f^{-1}(S\tilde{L}Fcl(f(lim\mathfrak{F})))$$

is a soft $\tilde{L}$-fuzzy C-*lim*-closed set in $X$. Also,

$$lim\mathfrak{F} \sqsubseteq f^{-1}(f(lim\mathfrak{F})) \sqsubseteq f^{-1}(S\tilde{L}Fcl(f(lim\mathfrak{F}))).$$

Now, by the definition of soft $\tilde{L}$-fuzzy C-*lim*-closure,

$$S\tilde{L}FC\text{-}cl(lim\mathfrak{F}) \sqsubseteq f^{-1}(S\tilde{L}Fcl(f(lim\mathfrak{F}))).$$

This implies that, $f(S\tilde{L}FC\text{-}cl(lim\mathfrak{F})) \sqsubseteq S\tilde{L}Fcl(f(lim\mathfrak{F}))$.

Conversely, let $\mathfrak{F} \in \mathbb{F}_p(Y)$. Suppose that $lim\mathfrak{F} \in \tilde{L}^Y$ is soft $\tilde{L}$-fuzzy *lim*-closed. Then, $f^{-1}(lim\mathfrak{F}) \in \tilde{L}^X$ . By hypothesis,

$$f(S\tilde{L}FC\text{-}cl(f^{-1}(lim\mathfrak{F}))) \sqsubseteq S\tilde{L}Fcl(f(f^{-1}(lim\mathfrak{F}))) \sqsubseteq S\tilde{L}Fcl\ (lim\mathfrak{F}) = lim\mathfrak{F}.$$

This implies that, $S\tilde{L}FC$-$cl(f^{-1}(lim\mathfrak{F})) \sqsubseteq f^{-1}(lim\mathfrak{F})$. It follows that, $f^{-1}(lim\mathfrak{F})$ is soft $\tilde{L}$-fuzzy C-$lim$-closed. Hence, $f$ is a soft $\tilde{L}$-fuzzy C-$lim$-convergence continuous function. □

**Proposition 5.3.** *Let $(X, \tau_{lim})$ be a soft $\tilde{L}$-fuzzy C-lim-convergence extremally disconnected space and $(Y, \sigma_{lim})$ be a soft $\tilde{L}$-fuzzy lim-convergence topological space. A function $f : (X, \tau_{lim}) \to (Y, \sigma_{lim})$ is a soft $\tilde{L}$-fuzzy C-*lim*-convergence continuous function. Then, for each $lim\mathfrak{F} \in \tilde{L}^X$, $S\tilde{L}FC$-$cl(S\tilde{L}Fint(lim\mathfrak{F})) \sqsubseteq S\tilde{L}FC$-$int(f^{-1}(S\tilde{L}Fcl(f\ (S\tilde{L}Fint(lim\mathfrak{F})))))$.*

*Proof.* Let $\mathfrak{F} \in \mathbb{F}(X)$. Let $lim\mathfrak{F} \in \tilde{L}^X$. Then, $S\tilde{L}Fint(lim\mathfrak{F})$ is a soft $\tilde{L}$-fuzzy $lim$-open set in $X$. By the hypothesis,

$$f(S\tilde{L}FC\text{-}cl(S\tilde{L}Fint(lim\mathfrak{F}))) \sqsubseteq S\tilde{L}Fcl(f(S\tilde{L}Fint(lim\mathfrak{F}))).$$

This implies that, $S\tilde{L}FC$-$cl(S\tilde{L}Fint(lim\mathfrak{F})) \sqsubseteq f^{-1}(S\tilde{L}Fcl(f(S\tilde{L}Fint(lim\mathfrak{F}))))$. Since $(X, \tau_{lim})$ is a soft $\tilde{L}$-fuzzy C-$lim$-convergence extremally disconnected space, it follows that, $S\tilde{L}FC$-$cl(S\tilde{L}Fint(lim\mathfrak{F})) \sqsubseteq S\tilde{L}FC$-$int(f^{-1}(S\tilde{L}Fcl\ (f(S\tilde{L}F\ int(lim\mathfrak{F})))))$. □

**Definition 5.4.** Let $(X, \tau_{lim})$ be a soft $\tilde{L}$-fuzzy $lim$-convergence topological space. A mapping $f : X \to \mathbb{R}(L \times L)$ is called as the *lower (upper) soft $\tilde{L}$-fuzzy C-*lim*-convergence continuous function*, if $f^{-1}R_t$ (respy. $f^{-1}L_t$ ) is a soft $\tilde{L}$-fuzzy C-$lim$-open set (soft $\tilde{L}$-fuzzy C-$lim$-closed set), for each $t \in \mathbb{R}$.

**Proposition 5.5.** *Let $(X, \tau_{lim})$ be a soft $\tilde{L}$-fuzzy lim-convergence topological space. Let $lim\mathfrak{F} \in \tilde{L}^X$. Let $f : X \to \mathbb{R}(L \times L)$ be such that*

$$f(x)(t) = \begin{cases} (1,1), & if\, t < 0 \\ lim\mathfrak{F}(x), & if\, t \in [0,1] \\ (0,0), & if\, t > 1 \end{cases}$$

*for all $x \in X$. Then, $f$ is lower (resp. upper) soft $\tilde{L}$-fuzzy C-lim-convergence continuous function iff $lim\mathfrak{F}$ is soft $\tilde{L}$-fuzzy C-lim-open (resp. C-lim-closed ).*

*Proof.* Let

$$f^{-1}R_t = \begin{cases} (1_X, 1_X), & \text{if } t < 0 \\ lim\mathfrak{F}, & \text{if } t \in [0,1] \\ (0_X, 0_X), & \text{if } t > 1 \end{cases}$$

This implies that, $f$ is lower soft $\tilde{L}$-fuzzy C-$lim$-convergence continuous function iff $lim\mathfrak{F}$ is soft $\tilde{L}$-fuzzy C-$lim$-open. Let

$$f^{-1}L_t = \begin{cases} (1_X, 1_X), & \text{if } t < 0 \\ lim\mathfrak{F}, & \text{if } t \in [0,1] \\ (0_X, 0_X), & \text{if } t > 1 \end{cases}$$

This implies that, $f$ is upper soft $\tilde{L}$-fuzzy C-$lim$-convergence continuous function iff $lim\mathfrak{F}$ is soft $\tilde{L}$-fuzzy C-$lim$-closed. □

**Definition 5.6.** The lim-*characteristic function of* $lim\mathfrak{F} \in \tilde{L}^X$ is the map $\chi_{lim\mathfrak{F}}$ : $X \to \mathbb{R}(L \times L)$ defined by

$$\chi_{lim\mathfrak{F}}(x) = \begin{cases} (1,1), & \text{if } t < 0 \\ lim\mathfrak{F}(x), & \text{if } t \in [0,1] \\ (0,0), & \text{if } t > 1 \end{cases}$$

for all $x \in X$.

**Proposition 5.7.** *Let* $(X, \tau_{lim})$ *be a soft* $\tilde{L}$*-fuzzy lim-convergence topological space. Let* $\mathfrak{F} \in \mathbb{F}(X)$*. Let* $lim\mathfrak{F} \in \tilde{L}^X$*. Then,* $\chi_{lim\mathfrak{F}}$ *is lower (upper) soft* $\tilde{L}$*-fuzzy C-lim-convergence continuous function iff* $lim\mathfrak{F}$ *is soft* $\tilde{L}$*-fuzzy C-lim-open ( C-lim-closed).*

*Proof.* It follows from the Proposition 5.5. □

**Proposition 5.8.** *Let* $(X, \tau_{lim})$ *be a soft* $\tilde{L}$*-fuzzy lim-convergence topological space. Let* $(X, \tau_{lim})$ *possess the property* $\nabla$*. Then, the following are equivalent.*

(a) $(X, \tau_{lim})$ *be a soft* $\tilde{L}$*-fuzzy C-lim-convergence extremally disconnected space.*

(b) *(Soft* $\tilde{L}$*-fuzzy Insertion Theorem:) Let* $g, h : X \to \mathbb{R}(L \times L)$*. If* $g$ *is lower soft* $\tilde{L}$*-fuzzy C-lim-convergence continuous function and* $h$ *is upper soft* $\tilde{L}$*-fuzzy C-lim-convergence continuous function with* $g \sqsubseteq h$*, then there exists a soft* $\tilde{L}$*-fuzzy C-lim-convergence continuous function,* $f : X \to \mathbb{R}(L \times L)$ *such that* $g \sqsubseteq f \sqsubseteq h$*.*

(c) *(Soft* $\tilde{L}$*-fuzzy Urysohn Lemma:) Let* $\mathfrak{F}, \mathfrak{G} \in \mathbb{F}_p(X)$*. If* $(lim\mathfrak{F})', lim\mathfrak{G}$ *are soft* $\tilde{L}$*-fuzzy C-lim-open sets such that* $lim\mathfrak{G} \sqsubseteq lim\mathfrak{F}$*, then there exists a soft* $\tilde{L}$*-fuzzy C-lim-convergent continuous function,* $f : X \to [0,1](L \times L)$ *such that* $lim\mathfrak{G} \sqsubseteq (L_1)'f \sqsubseteq R_0 f \sqsubseteq lim\mathfrak{F}$*.*

*Proof.* *(a)* ⇒ *(b)*: Define $lim\mathfrak{H}_r = L_r h$ and $lim\mathfrak{G}_r = R'_r g$, $r \in \mathbb{Q}$. Then, we have two monotone increasing families of soft $\tilde{L}$-fuzzy C-*lim*-open and soft $\tilde{L}$-fuzzy C-*lim*-closed sets of $(X, \tau_{lim})$. Moreover, $lim\mathfrak{H}_r \sqsubseteq lim\mathfrak{G}_r$, if $r < s$. By Proposition: 4.7, there exists a monotone increasing family $\{lim\mathfrak{F}_r\}_{r\in\mathbb{Q}}$ of soft $\tilde{L}$-fuzzy C-*lim*-clopen sets of $(X, \tau_{lim})$ such that $S\tilde{L}FC$-$cl(lim\mathfrak{H}_r) \sqsubseteq lim\mathfrak{F}_s$ and $lim\mathfrak{F}_r \sqsubseteq S\tilde{L}FC$-$int(lim\mathfrak{G}_s)$, whenever $r < s$. Let $lim\mathfrak{U}_t = \sqcap_{r<t}(lim\mathfrak{F}_r)'$, for all $t \in \mathbb{R}$, we define monotone decreasing family $\{lim\mathfrak{U}_t : t \in \mathbb{R}\} \subseteq \tilde{L}^X$. Moreover, we have $S\tilde{L}FC$-$cl(lim\mathfrak{U}_t) \sqsubseteq S\tilde{L}FC$-$int(lim\mathfrak{U}_s)$, whenever $s < t$. Now,

$$\begin{aligned} \sqcup_{t\in\mathbb{R}} lim\mathfrak{U}_t &= \sqcup_{t\in\mathbb{R}} \sqcap_{r<t} (lim\mathfrak{F}_r)' \\ &\sqsupseteq \sqcup_{t\in\mathbb{R}} \sqcap_{r<t} (lim\mathfrak{G}_r)' \\ &= \sqcup_{t\in\mathbb{R}} \sqcap_{r<t} g^{-1} R_r \\ &= \sqcup_{t\in\mathbb{R}} g^{-1} R_t \\ &= g^{-1}(\sqcup_{t\in\mathbb{R}} R_t) \\ &= (1_X, 1_X) \end{aligned}$$

Similarly

$$\sqcap_{t\in\mathbb{R}} lim\mathfrak{U}_t = (0_X, 0_X).$$

We now define a function $f : X \to \mathbb{R}(L \times L)$ possessing the required properties. Let $f(x)(t) = lim\mathfrak{U}_t(x)$, for all $x \in X, t \in \mathbb{R}$. By the above discussion, it follows that $f$

is well defined . To prove $f$ is soft $\tilde{L}$-fuzzy C-$lim$-convergence continuous function, we observe that,

$$\sqcup_{s>t} lim\mathfrak{U}_s = \sqcup_{s>t} S\tilde{L}FC\text{-}int(lim\mathfrak{U}_s)$$

and

$$\sqcap_{s<t} lim\mathfrak{U}_s = \sqcap_{s<t} S\tilde{L}FC\text{-}cl(lim\mathfrak{U}_s)$$

Then, $f^{-1}R_t = \sqcup_{s>t} lim\mathfrak{U}_s = \sqcup_{s>t} S\tilde{L}FC\text{-}int(lim\mathfrak{U}_s)$ is soft $\tilde{L}$-fuzzy C-$lim$-open set and also, $f^{-1}(L'_t) = \sqcap_{s<t} lim\mathfrak{U}_s = \sqcap_{s<t} S\tilde{L}FC\text{-}cl(lim\mathfrak{U}_s)$ is soft $\tilde{L}$-fuzzy C-$lim$-closed set. Therefore, $f$ is a soft $\tilde{L}$-fuzzy C-$lim$-convergence continuous function. To conclude the proof, it remains to show that $g \sqsubseteq f \sqsubseteq h$. It is enough to show that, $g^{-1}(lim(\widetilde{1_X, X}) - L_t) \sqsubseteq f^{-1}(L'_t) \sqsubseteq h^{-1}(L'_t)$ and $g^{-1}R_t \sqsubseteq f^{-1}R_t \sqsubseteq h^{-1}R_t$, for each $t \in \mathbb{R}$. Now, we have

$$\begin{aligned}
g^{-1}(lim(\widetilde{1_X, X}) - L_t) &= g^{-1}(L'_t) \\
&= \sqcap_{s<t} g^{-1}(L'_s) \\
&= \sqcap_{s<t} \sqcap_{r<s}\, g^{-1}R_r \\
&= \sqcap_{s<t} \sqcap_{r<s}\, (lim\mathfrak{G}_r)' \\
&\sqsubseteq \sqcap_{s<t} \sqcap_{r<s}\, (lim(\widetilde{1_X, X}) - lim\mathfrak{F}_r) \\
&= \sqcap_{s<t} lim\mathfrak{U}_s \\
&= f^{-1}(lim(\widetilde{1_X, X}) - L_t)
\end{aligned}$$

Now,

$$\begin{aligned}
f^{-1}(L'_t) &= \sqcap_{s<t} lim\mathfrak{U}_s \\
&= \sqcap_{s<t} \sqcap_{r<s}\, (lim(\widetilde{1_X, X}) - lim\mathfrak{F}_r) \\
&\sqsubseteq \sqcap_{s<t} \sqcap_{r<s}\, (lim(\widetilde{1_X, X}) - lim\mathfrak{H}_r) \\
&= \sqcap_{s<t} \sqcap_{r<s}\, h^{-1}(lim(\widetilde{1_X, X}) - L_r) \\
&= \sqcap_{s<t} h^{-1}(L'_s) \\
&= h^{-1}(L'_t)
\end{aligned}$$

Similarly, we obtain,

$$\begin{aligned}
g^{-1}R_t &= \sqcup_{s>t} g^{-1}R_s \\
&= \sqcup_{s>t} \sqcup_{r>s}\, g^{-1}R_r \\
&= \sqcup_{s>t} \sqcup_{r>s}\, (lim(\widetilde{1_X, X}) - lim\mathfrak{G}_r) \\
&\sqsubseteq \sqcup_{s>t} \sqcap_{r<s}\, (lim(\widetilde{1_X, X}) - lim\mathfrak{F}_r) \\
&= \sqcup_{s>t} lim\mathfrak{U}_s \\
&= f^{-1}R_t
\end{aligned}$$

Now,

$$\begin{aligned} f^{-1}R_t &= \sqcup_{s>t} lim\mathfrak{U}_s \\ &= \sqcup_{s>t} \sqcap_{r<s} (lim(\widetilde{1_X, X}) - lim\mathfrak{F}_r) \\ &\sqsubseteq \sqcup_{s>t} \sqcup_{r>s} (lim(\widetilde{1_X, X}) - lim\mathfrak{H}_r) \\ &= \sqcup_{s>t} \sqcup_{r>s} h^{-1}(L'_r) \\ &= \sqcup_{s>t} h^{-1}R_s \\ &= h^{-1}R_t \end{aligned}$$

Thus, (b) is proved.

$(b) \Rightarrow (c)$: Suppose that $lim\mathfrak{F}$ is soft $\tilde{L}$-fuzzy C-$lim$-closed set and $lim\mathfrak{G}$ is soft $\tilde{L}$-fuzzy C-$lim$-open set such that $lim\mathfrak{G} \sqsubseteq lim\mathfrak{F}$. Then, by the Proposition: 5.7, $\chi_{lim\mathfrak{G}} \sqsubseteq \chi_{lim\mathfrak{F}}$, where $\chi_{lim\mathfrak{G}}$ and $\chi_{lim\mathfrak{F}}$ are the lower and upper soft $\tilde{L}$-fuzzy C-$lim$-convergence continuous functions respectively. Hence, by (b), there exists a soft $\tilde{L}$-fuzzy C-$lim$-convergence continuous function, $f : X \to \mathbb{R}(L \times L)$ such that $\chi_{lim\mathfrak{G}} \sqsubseteq f \sqsubseteq \chi_{lim\mathfrak{F}}$. Clearly, $f(x) \in \tilde{L}^{\mathbb{R}}$, for all $x \in \mathbb{R}$ and

$$lim\mathfrak{G} = L'_1\chi_{lim\mathfrak{G}} \sqsubseteq L'_1 f \sqsubseteq R_0 f \sqsubseteq R_0\chi_{lim\mathfrak{F}} = lim\mathfrak{F}.$$

Therefore, $lim\mathfrak{G} \sqsubseteq L'_1 f \sqsubseteq R_0 f \sqsubseteq lim\mathfrak{F}$.

$(c) \Rightarrow (a)$ : Let $lim\mathfrak{F}$ be a soft $\tilde{L}$-fuzzy C-$lim$-closed set and $lim\mathfrak{G}$ be a soft $\tilde{L}$-fuzzy C-$lim$-open set such that $lim\mathfrak{G} \sqsubseteq lim\mathfrak{F}$. Then, by the hypothesis there exists a soft $\tilde{L}$-fuzzy C-$lim$-convergence continuous function, $f : X \to [0, 1](L \times L)$ such that $L'_1 f \sqsubseteq R_0 f$. In fact that, $L'_1$ is a soft $\tilde{L}$-fuzzy $lim$-closed set and $R_0$ is a soft $\tilde{L}$-fuzzy $lim$-open set. Since $lim\mathfrak{G} \sqsubseteq L'_1 f \sqsubseteq R_0 f \sqsubseteq lim\mathfrak{F}$, it follows that, $S\tilde{L}FC\text{-}cl(lim\mathfrak{G}) \sqsubseteq S\tilde{L}FC\text{-}cl((L'_1)f) = (L'_1)f$. Similarly, $R_0 f = S\tilde{L}FC\text{-}int(R_0 f) \sqsubseteq S\tilde{L}FC\text{-}int(lim\mathfrak{F})$. This implies that, $S\tilde{L}FC\text{-}cl(lim\mathfrak{G}) \sqsubseteq S\tilde{L}FC\text{-}int(lim\mathfrak{F})$. By the Proposition: 4.3, $(X, \tau_{lim})$ is a soft $\tilde{L}$-fuzzy C-$lim$-convergence extremally disconnected space. □

## 6. Tietze extension theorem on soft $\tilde{L}$-fuzzy C-$lim$-convergence extremally disconnected space

**Definition 6.1.** Let X be any non-empty crisp set. Let $A$ be any subset of $X$ and $\chi^*_A$: $X \to \{(1_X, 1_X), (0_X, 0_X)\}$. Then, the *characteristic* function of A*, $\chi^*_A$ is defined as

$$\chi^*_A(x) = \begin{cases} (1_X, 1_X), & \text{if } x \in A \\ (0_X, 0_X), & \text{if } x \notin A \end{cases}$$

for all $x \in X$.

**Proposition 6.2.** *Let $(X, \tau_{lim})$ be a soft $\tilde{L}$-fuzzy C-lim-convergence extremally disconnected space. Let $(X, \tau_{lim})$ possess the property $\nabla$. Let $A \subseteq X$ such that $\chi^*_A$ is a soft $\tilde{L}$-fuzzy C-lim-open set in $(X, \tau_{lim})$. Let $f : (A, \tau_{lim/A}) \to [0, 1](L \times L)$ be a soft $\tilde{L}$-fuzzy C-lim-convergence continuous function. Then, f has a soft $\tilde{L}$-fuzzy C-lim-convergence continuous extension over $(X, \tau_{lim})$.*

*Proof.* Let $g, h : X \to [0,1](L \times L)$ be such that $g = f = h$ on $A$ and $g(x) = (0_X, 0_X)$, if $x \notin A$ and $h(x) = (1_X, 1_X)$, if $x \notin A$. We now have,

$$R_t g = \begin{cases} lim\mathfrak{G}_t \sqcap \chi_A^*, & \text{if } t \geq 0 \\ (1_X, 1_X), & \text{if } t < 0 \end{cases}$$

for all $t \in \mathbb{R}$, where $lim\mathfrak{G}_t$ is a soft $\tilde{L}$-fuzzy C-$lim$-open set such that $lim\mathfrak{G}_t/A = R_t g$ and

$$L_t h = \begin{cases} lim\mathfrak{H}_t \sqcap \chi_A^*, & \text{if } t \leq 1 \\ (0_X, 0_X), & \text{if } t > 1 \end{cases}$$

for all $t \in \mathbb{R}$, where $lim\mathfrak{H}_t$ is a soft $\tilde{L}$-fuzzy C-$lim$-closed set such that $lim\mathfrak{H}_t/A = L_t h$. Thus, $g$ is a lower soft $\tilde{L}$-fuzzy C-$lim$-convergence continuous function and $h$ is a upper soft $\tilde{L}$-fuzzy C-$lim$-convergence continuous function with $g \sqsubseteq h$. Now, by the Proposition: 5.8, there exists a soft $\tilde{L}$-fuzzy C-$lim$-convergence continuous function, $\mathcal{F} : X \to [0,1](L \times L)$ such that $g \leq \mathcal{F} \leq h$. Hence, $\mathcal{F} \equiv f$ on $A$. □

**Acknowledgements.** The authors like to express our gratitude to the reviewers for their valuable suggestions to improve our paper.

## References

[1] C. L. Chang, Fuzzy topological spaces, J. Math. Anal. Appl. 24 (1968) 191–201.
[2] E. Hatir, T. Noiri and S. Yuksel, A decomposition of continuity, Acta. Math. Hungar. 70 (1996) 145–150.
[3] Bruce Hutton, Normality in fuzzy topological spaces, J. Math. Anal. Appl. 50 (1975) 74–79.
[4] D.C. Kent and G.D. Richardson, The regularity series of a convergence space, Bull. Austral. Math. Soc. 13 (1975) 21–44.
[5] P. K. Maiji, R. Biswas and A. R. Roy, Fuzzy soft sets, J. Fuzzy Math. 9 (2001) 589–602.
[6] D. Molodtsov, Soft set theory - final result, Comput. Math. Appl. 37 (1999) 19–31.
[7] P. Smets, The degree of belief in a fuzzy event, Inform. Sci. 25 (1981) 1–19.
[8] A. P. Sostak, Basic structures of fuzzy topology, J. Math. Sci. 78(6) (1996) 662–701.
[9] M. Sugeno, An introductory survey of fuzzy control, Inform. Sci. 36 (1985) 59–83.
[10] G. Richardson, Q. Xue and J. Zhang, Fuzzy convergence: open and proper maps, Fuzzy Sets and Systems 152 (2005) 373–384.
[11] S. E. Rodabaugh, The Hausdroff separation axioms for fuzzy topological spaces, Topology Appl. 11 (1980) 319–334.
[12] S. E. Rodabaugh, A lattice of continuity for fuzzy topological spaces, J. Math. Anal. Appl. 79 (1981) 244–255.
[13] S. E. Rodabaugh, Suitability in fuzzy topological spaces, J. Math. Anal. Appl. 79 (1981) 273–285.
[14] Thomas Kubiak, Extending continuous L - Real functions, Math. Japonica 31(6) (1986) 875–887.
[15] Thomas Kubiak, L-fuzzy normal spaces and Tietze extension theorem, J. Math. Anal. Appl. 125 (1987) 141–153.
[16] Ismail. U. Tiryaki, Fuzzy sets over the poset $I$, Hacet. J. Math. Stat. 37(2) (2008) 143–166.
[17] M. K. Uma, E. Roja and G. Balasubramanian, A new characterization of fuzzy extremally disconnected spaces, AttiSem. Mat. Fis. Univ. Modenae Reggio Emilia, L III, 289–297 (2005).
[18] T. Yogalakshmi, E. Roja and M. K. Uma, A view on soft fuzzy C-continuous function, J. Fuzzy Math. 21(2) (2013) 349–370.
[19] L. A. Zadeh, Fuzzy Sets, Information and Control 8 (1965) 338–353.

T. Yogalakshmi (YogaPrithvi_ssp@yahoo.co.in)
Department of Mathematics, Sri Sarada College for Women (Autonomous), Salem 16, TamilNadu, India

E. Roja (ar.udhay@yahoo.co.in)
Department of Mathematics, Sri Sarada College for Women (Autonomous), Salem 16, TamilNadu, India

M. K. Uma (ar.udhay@yahoo.co.in)
Department of Mathematics, Sri Sarada College for Women (Autonomous), Salem 16, TamilNadu, India