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COMMON FIXED POINT THEOREM IN INTUITIONISTIC FUZZY METRIC SPACE

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ABSTRACT

In this paper, we prove a common fixed point theorem for six self mapping in intuitionistic fuzzy metric spaces under various conditions. Our results generalizes the recent result of Ranadive and Chauhan [6].

Keywords: Absorbing maps, ϵ –chainable fuzzy metric space, Intuitionistic fuzzy metric space, Reciprocal continuous maps, Semi-compatible.

I.INTRODUCTION

The foundation of fuzzy mathematics is laid by Zadeh [7] with the introduction of fuzzy sets in 1965, as a way to represent vagueness in everyday life. Attanassov [1] introduced and studied the concept of intuitionistic fuzzy metric set as generalizations of fuzzy sets. Intuitionistic fuzzy metric set deals with both the degree of nearness and non-nearness. Park [4] defined the notion of intuitionistic fuzzy metric space with the help of continuous t-norm and continuous t-conorm as generalizations of fuzzy metric space due to George and Veeramani[3].
Ranadive, Gopal and Mishra [5] introduced the concept of absorbing maps in metric space and proved common fixed point theorem in this spaces with observing that the new notion of absorbing maps is neither a sub-class of compatible maps nor a sub-class of non compatible maps. Cho and Jung [2] introduced ϵ −chainable fuzzy metric space and proved common fixed point theorems for weakly compatible in ϵ −chainable fuzzy metric space. Ranadive and Chauhan [6] proved a common fixed point theorem for six self mappings using absorbing maps with ϵ −chainable fuzzy metric space.

II. PRELIMINARIES

Definition 2.1 A binary operation $*$: [0, 1] × [0, 1] → [0, 1] is continuous t-norm if $*$ satisfies the following conditions:

(i) $*$ is commutative and associative

(ii) $*$ is continuous;

(iii) $a * 1 = a$ for all $a \in [0, 1]$;

(iv) $a * b \le c * d$ whenever $a \le c$ and $b \le d$ for all $a, b, c, d \in [0, 1]$.

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Definition 2.2 A binary operation $\Diamond$: $[0, 1] \times [0, 1] \to [0, 1]$ is continuous t-conorm if $\Diamond$ satisfies the following conditions:

(i) $\Diamond$ is commutative and associative;

(ii) $\Diamond$ is continuous;

(iii) $a \Diamond 0 = a$ for all $a \in [0, 1]$;

(iv) $a \Diamond b \leq c \Diamond d$ whenever $a \leq c$ and $b \leq d$ for all $a, b, c, d \in [0, 1]$.

Definition 2.3 A 5-tuple $(X, M, N, *, \Diamond)$ is said to be an intuitionistic fuzzy metric space if X is an arbitrary set, $*$ is a continuous t-norm, $\Diamond$ is a continuous t-conorm and M,N are fuzzy sets on $X^2 \times [0,\infty)$ satisfying following conditions:

(i) $M(x, y, t) + N(x, y, t) \leq 1$ for all $x, y \in X$ and $t > 0$;

(ii) $M(x, y, 0) = 0$ for all $x, y \in X$;

(iii) $M(x, y, t) = 1$ for all $x, y \in X$ and $t > 0$ if and only if $x = y$;

(iv) $M(x, y, t) = M(y, x, t)$ for all $x, y \in X$ and $t > 0$;

(v) $M(x, y, t) * M(y, z, s) \leq M(x, z, t + s)$ for all $x, y, z \in X$ and $s, t > 0$;

(vi) for all $x, y \in X$, $M(x, y, \cdot) : [0,\infty) \to [0, 1]$ is left continuous;

(vii) $\lim_{n\to\infty} M(x, y, t) = 1$ for all $x, y \in X$ and $t > 0$;

(viii) $N(x, y, 0) = 1$ for all $x, y \in X$;

(ix) $N(x, y, t) = 0$ for all $x, y \in X$ and $t > 0$ if and only if $x = y$;

(x) $N(x, y, t) = N(y, x, t)$ for all $x, y \in X$ and $t > 0$;

(xi) $N(x, y, t) \Diamond N(y, z, s) \geq N(x, z, t + s)$ for all $x, y, z \in X$ and $s, t > 0$;

(xii) for all $x, y \in X$, $N(x, y, \cdot) : [0,\infty) \to [0, 1]$ is right continuous;

(xiii) $\lim_{n\to\infty} N(x, y, t) = 0$ for all $x, y \in X$.

The functions M(x,y,t) and N(x,y,t) denote the degree of nearness and the degree of non-nearness between x and y with respect to t respectively.

Definition 2.4 Let $(X, M, N, *, \Diamond)$ be an intuitionistic fuzzy metric space. Then a sequence $\{x_n\}$ in X is said to be

(i) Convergent to a point $x \in X$ if

$$\lim_{n\to\infty} M(x_n, x, t) = 1 \text{ and } \lim_{n\to\infty} N(x_n, x, t) = 0 \text{ for all } t > 0,$$

(ii) Cauchy sequence if

$$\lim_{n\to\infty} M(x_{n+p}, x_n, t) = 1 \text{ and } \lim_{n\to\infty} N(x_{n+p}, x_n, t) = 0 \text{ for all } t > 0 \text{ and } p > 0.$$

Definition 2.5 An intuitionistic fuzzy metric space $(X, M, N, *, \Diamond))$ is said to be complete if and only if every Cauchy sequence in X is convergent.

Definition 2.6 Let $(X, M, N, *, \Diamond)$ be an intuitionistic fuzzy metric space and $\varepsilon>0$. A finite sequence

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$x=x_0, x_1, x_2,\ldots,x_n=y$ is called $\epsilon - chain$ from x to y if

$M(x_i,x_{i-1},t)>1-\varepsilon$ and $N(x_i,x_{i-1},t)<\varepsilon$ for all $t>0$ and $i=1,2,\ldots n$.

A intuitionistic fuzzy metric space $(X,M,N,*,\Diamond)$ is called $\epsilon - chainable$ if for any $x,y\in X$ there exists an $\epsilon - chain$ from x to y.

Definition 2.7 Let A and B be two self-maps on intuitionistic fuzzy metric space $(X, M, N,*, \Diamond)$.then A is called B-absorbing if there exists a positive $R>0$ such that

$M(Bx,BAx,t)\geq M(Bx,Ax,\frac{t}{R})$ and $N(Bx,BAx,t)\leq M(Bx,Ax,\frac{t}{R})$ for all $x\in X$.

Similarly,B is called A-absorbing if there exists a positive $R>0$ such that

$M(Ax,ABx,t)\geq M(Ax,Bx,\frac{t}{R})$ and $N(Ax,ABx,t)\leq M(Ax,Bx,\frac{t}{R})$ for all $x\in X$.

Definition 2.8 Let A and S be self-mappings of an intuitionistic fuzzy metric space $(X, M, N,*, \Diamond)$ Then a pair (A, S) is said to be commuting if $M(ASx, SAx, t) = 1$ and $N(ASx, SAx, t) = 0$.

Definition 2.9 Let A and S be mappings from a fuzzy metric space $(X,M, *)$ into itself. Then,

the mappings are said to be compatible if $\lim_{n\to\infty}M\_(ASxn, SAxn, t)= 1, \forall t > 0$

whenever $\{x_n\}$ is a sequence in X such that $\lim_{n\to\infty}Axn = \lim_{n\to\infty}Sxn =x \in X$.

Definition 2.10 Self mappings A and S of a Fuzzy metric space (X, M, *) are said to be semi-compatible if and only if $M(ASxn, Sp, t) \to 1$ for all $t > 0$, whenever $\{xn\}$ is a sequence in X such that $Sxn, Axn \to p$ for some p in X as $n \to \infty$.

Definition 2.11 Let A and S be mappings from a fuzzy metric space $(X,M, *)$ into itself. Then, the mappings are said to be reciprocally continuous if $\lim_{n\to\infty}ASx_n = Ax$, $\lim_{n\to\infty}SAx_n = Sx$

whenever $\{x_n\}$ is a sequence in X such that

$\lim_{n\to\infty}Ax_n = \lim_{n\to\infty}Sx_n = x \in X$.

Lemma 2.1 Let $\{u_n\}$ is a sequence in an intuitionistic fuzzy metric space $(X, M, N,*, \Diamond)$. If there exists a constant $k \in (0, 1)$ such that $M(u_n, u_{n+1}, kt) \geq M(u_{n-1}, u_n, t)$ and $N(u_n, u_{n+1}, kt) \leq N(u_{n-1}, u_n, t)$

for $n = 1, 2, 3, \ldots$, then $\{u_n\}$ is a Cauchy sequence in X.

Lemma 2.2 Let $(X, M, N ,*, \Diamond)$.be an intuitionistic fuzzy metric space. If there exists a constant $k \in (0, 1)$ such that

$M(x, y, kt) \geq M(x, y, t)$ and $N(x, y, kt) \leq N(x, y, t)$

for all $x, y \in X$ and $t > 0$, then $x = y$.

III.MAIN RESULTS

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Theorem 3.1 Let (X, M, N,*,◊) be a complete ϵ-chainable intuitionistic fuzzy metric space with continuous t-norm and continuous t-conorm ◊ defined by $t*t \geq t$ and (1-t)◊(1-t)$\leq$ (1-t) for all t$\in$[0, 1]. Let A, B, S, T P and Q be mappings from X into itself such that

P(X)⊆ST(X) and Q(X)⊆AB(X).

There ∃ a constant k∈(0,1) such that

M(Px,Qy,kt)≥min{M(STx,ABy,t)∗M(STx,Qy,t)∗M(Qy, ABy,t)∗ $[M(Px, ABy, t) + M(Px, STx, t)]/2$ }

and

N(M(Px,Qy,kt)≤max{M(STx,ABy,t)∗M(STx,Qy,t)∗M(Qy,ABy,t)∗ $[M(Px, ABy, t) + M(Px, STx, t)]/2$ }

for all x, y ∈ X.

(3) If one of P(X), ST(X),AB(X) and Q(X) is a complete subspace of X then

(a) The pair (A, BP) has a coincidence point.

(b) The pair (Q, ST) has a coincidence point.

(4) AB=BA, ST=TS,PB=BP,QT=TQ.

(5)The pairs {P, AB} and {Q, ST} are semi-compatible and reciprocally continuous , then A, B, S, T,P and Q have a unique common fixed point in X.

Proof: Let x_0 be an arbitrary point of X. By (1) there ∃ x_1,x_2 ∈X:

$Px_0=ST x_1=y_0$ and $Qx_1=ABx_2=y_1$

In general, we can find a sequence $\{x_n\}$ and $\{y_n\}$ in X:

$Px_{2n}=STx_{2n+1}=y_{2n}$ and

$Qx_{2n+1}=ABx_{2n+2}=y_{2n+1}$, for n=1, 2 …

By taking $x=x_{2n}$ and $y=x_{2n+1}$ in (2), we have

$$M(Px_{2n},Qx_{2n+1},kt)\geq\min\{M(STx_{2n},ABx_{2n+1},t)*M(STx_{2n},Qx_{2n+1},t)*M(Qx_{2n+1},ABx_{2n+1},t)*$$

$$[M(Px_{2n}, ABx_{2n+1}, t) + M(Px_{2n}, STx_{2n}, t)]/2$$

and

$$N(Px_{2n},Qx_{2n+1},kt)\leq\max\{N(STx_{2n},ABx_{2n+1},t)\Diamond N(STx_{2n},Qx_{2n+1},t)\Diamond N(Qx_{2n+1},ABx_{2n+1},t)\Diamond$$

$$[N(Px_{2n}, ABx_{2n+1}, t) + N(Px_{2n}, STx_{2n}, t)]/2$$

$$M(y_{2n},y_{2n+1},kt)\geq\min\{M(y_{2n-1},y_{2n},t)*M(y_{2n-1},y_{2n},t)*M(y_{2n+1},y_{2n},t)*$$

$$[M(y_{2n}, y_{2n-1}, t) + M(y_{2n}, y_{2n-1}, t)]/2$$

and

$$N(y_{2n},y_{2n+1},kt)\leq\max\{N(y2n-1,y2n,t)\Diamond N(y2n-1,y2n,t)\Diamond N(y2n+1,y2n,t)\Diamond$$

$$[N(y_{2n}, y_{2n-1}, t) + N(y_{2n}, y_{2n-1}, t)]/2$$

$M(y_{2n},y_{2n+1},kt) \geq \min\{M(y_{2n-1},y_{2n},t) * M(y_{2n+1},y_{2n},t) * M(y_{2n},y_{2n-1},t)$

$\geq M(y_{2n-1},y_{2n},t)$

and

$N(y_{2n},y_{2n+1},kt) \leq \max\{N(y_{2n-1},y_{2n},t) \lozenge N(y_{2n+1},y_{2n},t) \lozenge N(y_{2n},y_{2n-1},t)$

$\leq N(y_{2n-1},y_{2n},t)$

Similarly, we also have

$M(y_{2n},y_{2n+1},kt) \geq M(y_{2n-1},y_{2n},t)$

and $N(y_{2n},y_{2n+1},kt) \leq N(y_{2n-1},y_{2n},t)$

therefore for all n, we have

$M(y_n,y_{n+1},kt) \geq M(y_n,y_{n-1},{}^{t}/_{k}) \geq M(y_n,y_{n-1},{}^{t}/_{k^2}) \geq \ldots \geq M(y_n,y_{n-1},{}^{t}/_{k^n}) \rightarrow 1$ as $n \rightarrow \infty$ and

$N(y_n,yn+1,kt) \leq N(y_n,y_{n-1},{}^{t}/_{k}) \leq N(y_n,y_{n-1},{}^{t}/_{k^2}) \leq \ldots \leq N(y_n,y_{n-1},{}^{t}/_{k^n}) \rightarrow 1$ as $n \rightarrow \infty$ for any $t>0$.

For each $\varepsilon>0$ and each $t>0$, we can choose $n_0 \in N$ such that

$M(y_n,y_{n+1},t)>1-\varepsilon$ and $N(y_n,y_{n+1},t)<1-\varepsilon$. For all $n>n0$, $m, n \in N$, we suppose that $m \geq n$.then we have that

$M(y_n,y_m,t) \geq M(y_n,y_{n+1},{}^{t}/_{m-n}) * M(y_{n+1},y_{n+2},{}^{t}/_{m-n}) * \ldots * M(y_{m-1},y_m,{}^{t}/_{m-n})$

$\geq (1-\varepsilon)*(1-\varepsilon)*(1-\varepsilon)* \ldots *(1-\varepsilon)$

$\geq (1-\varepsilon)$

Similarly $N(y_n,y_n,t) \leq (1-\varepsilon)$.

Hence $\{y_n\}$ is a cauchy sequence in X; that is $y_n \rightarrow z$ in X; So its subsequences, $Px_{2n}, STx_{2n+1}, ABx_{2n}, Qx_{2n+1}$ also converges to z.Since X is $\varepsilon - chainable$,there $\exists$ $\varepsilon - chain$ from x_n to x_{n+1} such that

$M(y_i,y_{i-1},t)>1-\varepsilon$ and $N(y_i,y_{i-1},t)<1-\varepsilon$ for all $t>0$ and $i=1,2,\ldots l$.

Thus we have

$M(x_n,x_{n+1},t)>M(y_1,y_2,{}^{t}/_{l}) * M(y_2,y_3,{}^{t}/_{l}) * \ldots * M(y_{i-1},y_i,t)$

$> (1-\varepsilon)*(1-\varepsilon)*(1-\varepsilon)* \ldots *(1-\varepsilon)$

$\geq (1-\varepsilon)$ and

$N(x_n,x_{n+1},t)<N(y_1,y_2,{}^{t}/_{l}) \lozenge N(y_2,y_3,{}^{t}/_{l}) \lozenge \ldots \lozenge N(y_{i-1},y_i,t)$

$< (1-\varepsilon) \lozenge (1-\varepsilon) \lozenge (1-\varepsilon) \lozenge \ldots \lozenge (1-\varepsilon)$

$\leq (1-\varepsilon)$

So $\{x_n\}$ is a Cauchy sequence in X and hence there $\exists$ $z \in X$ such that $x_n \rightarrow z$.

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Since the pair of (P,ST) and (Q,AB) is reciprocal continuous; we have $\lim_{n\to\infty} P(ST)x_{2n} \to Pz$ and $\lim_{n\to\infty} ST(P)x_{2n} \to STz$ and semi-compatibility of (P,ST) which gives $\lim_{n\to\infty} ST(P)x_{2n} \to STz$,therefore

Pz=STz.we claim Pz=STz=z.

Step 1: Putting x=z and $y=x_{2n+1}$ in(2),we have

$$M(Pz,Qx_{2n+1},kt) \geq \min\{M(STz,ABx_{2n+1},t)*M(STz,Qx_{2n+1},t)*M(Qx_{2n+1},ABx_{2n+1},t)*$$

$$[M(Pz,ABx_{2n+1},t)+M(Pz,STz,t)]/2\}$$

and

$$N(Pz,Qx_{2n+1},kt) \leq \max\{n(STz,ABx_{2n+1},t) \lozenge N(STz,Qx_{2n+1},t) \lozenge M(Qx_{2n+1},ABx_{2n+1},t) \lozenge$$

$$[N(Pz,ABx_{2n+1},t)+N(Pz,STz,t)]/2\}$$

Letting $n\to\infty$, we have

$$M(Pz,z,kt) \geq \min\{M(Pz,z,t)*M(Pz,z,t)*M(z,z,t)*[M(Pz,z,t)+M(Pz,z,t)]/2\}$$

and

$$N(Pz,z,kt) \leq \max\{N(Pz,z,t) \lozenge N(Pz,z,t) \lozenge N(z,z,t) \lozenge [N(Pz,z,t)+N(Pz,z,t)]/2\}$$

$$M(Pz,z,kt) \geq \min\{M(Pz,z,t)*M(Pz,z,t)*1*M(Pz,z,t)\}$$

$$\geq 1$$

M(Pz,z,t)=1

and N(Pz,z,t)=1.

Hence Pz=z=STz.

Step 2: Putiing x=Bz, $y=x_{2n+1}$ in (2),we have

$$M(P(Bz),Qx_{2n+1},kt) \geq \min\{M(ST(Bz),ABx_{2n+1},t)*M(ST(Bz),Qx_{2n+1},t)*M(Qx_{2n+1},ABx_{2n+1},t)*$$

$$[M(P(Bz),ABx_{2n+1},t)+M(P(Bz),ST(Bz),t)]/2\}$$

and

$$N(P(Bz),Qx_{2n+1},kt) \leq \max\{N(ST(Bz),ABx_{2n+1},t) \lozenge N(ST(Bz),Qx_{2n+1},t) \lozenge M(Qx_{2n+1},ABx_{2n+1},t) \lozenge$$

$$[N(P(Bz),ABx_{2n+1},t)+N(P(Bz),ST(Bz),t)]/2\}$$

Letting $n\to\infty$ we have

Since PB=BP,AB=BA, so P(Bz)=B(Pz)=Bz and AB(Bz)=B(ABz)=Bz

$$M(Bz,z,kt) \geq \min\{M(Bz,z,t)*M(Bz,z,t)*M(z,z,t)*[M(Bz,z,t)+M(Bz,z,t)]/2\}$$

and

$$N(Bz),z,kt) \leq \max\{N(Bz,z,t) \lozenge N(Bz,z,t) \lozenge M(z,z,t) \lozenge [N(Bz,z,t)+N(Bz,z,t)]/2\}$$

M(Bz,z,t)=1 and N(Bz,z,t)=1.

Therefore Az=Bz=Pz=z.

Step 3: $P(X)\subseteq ST(X)$,there $\exists$ $u\in X$,such that $z=Pz=STu$.

Putting $x=x_{2n},y=u$ in (2),we have

$M(Px_{2n},Qu,kt)\geq \min\{M(STx_{2n},ABu,t)*M(STx_{2n},Qu,t)*M(Qu,ABu,t)*$

$$[M(Px_{2n},ABu,t)+M(Px_{2n},STu,t)]/2\}$$

and

$N(Px_{2n},Qu,kt)\leq \max\{N(STx_{2n},ABu,t)\lozenge N(STx_{2n},Qu,t)\lozenge M(Qu,ABu,t)\lozenge$

$$[N(Px_{2n},ABu,t)+N(Px_{2n},STu,t)]/2\}$$

Letting $n\to\infty$,we have

$M(z,Qu,kt)\geq \min\{M(z,z,t)*M(z,Qu,t)*M(Qu,z,t)*[M(z,z,t)+M(z,z,t)]/2\}$

and

$N(z,Qu,kt)\leq \max\{N(z,z,t)\lozenge N(z,Qu,t)\lozenge M(Qu,z,t)\lozenge [N(z,z,t)+N(z,z,t)]/2\}$

$M(z,Qu,t)=1$ and $N(z,Qu,t)=1$.

Therefore $z=Qu=Abu$.

Since Q is AB-absorbing ;then

$M(Abu,ABQu,kt)\geq M(Abu,Qu,{}^{t}/_{R})=1$

i.e. $Abu=ABQu \Rightarrow z=ABz$.

Step 4: Putting $x=x_{2n},y=z$ in(2),we have

$M(Px_{2n},Qz,kt)\geq \min\{M(STx_{2n},ABz,t)*M(STx_{2n},Qz,t)*M(Qz,ABz,t)*$

$$[M(Px_{2n},ABz,t)+M(Px_{2n},STx_{2n},t)]/2\}$$

and

$N(Px_{2n},Qz,kt)\leq \max\{N(STx_{2n},ABz,t)\lozenge N(STx_{2n},Qz,t)\lozenge M(Qz,ABz,t)\lozenge$

$$[N(Px_{2n},ABz,t)+N(Px_{2n},STx_{2n},t)]/2\}$$

Letting $n\to\infty$,we have

$M(z,Qz,kt)\geq \min\{M(z,z,t)*M(z,Qz,t)*M(Qz,z,t)*[M(z,z,t)+M(z,z,t)]/2\}$

and

$N(z,Qz,kt)\leq \max\{N(z,z,t)\lozenge N(z,Qz,t)\lozenge M(Qz,z,t)\lozenge [N(z,z,t)+N(z,z,t)]/2\}$

i.e.$M(z,Qz,kt)\geq M(z,Qz,t)$ and

$N(z,Qz,kt)\leq N(z,Qz,t)$

Therefore $z=Qz=ABz$.

Step 5:Put $x=x_{2n},y=Tz$ in (2),we have

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$M(Px_{2n},QTz,kt) \geq \min\{M(STx_{2n},AB(Tz),t) * M(STx_{2n},Q(Tz),t) * M(Q(Tz),AB(Tz),t) *$

$$[M(Px_{2n},AB(Tz),t) + M(Px_{2n},STx_{2n},t)]/2\}$$

and

$N(Px_{2n},QTz,kt) \leq \max\{N(STx_{2n},AB(Tz),t) \Diamond N(STx_{2n},Q(Tz),t) \Diamond M(Q(Tz),AB(Tz),t) \Diamond$

$$[N(Px_{2n},AB(Tz),t) + N(Px_{2n},STx_{2n},t)]/2\}$$

Since QT=TQ,ST=TS, therefore Q(Tz)=T(Qz)=Tz,ST(Tz)=T(STz)=Tz,

Letting $n \rightarrow \infty$, we have

$M(z,Tz,kt) \geq \min\{M(z,Tz,t) * M(z,Tz,t) * M(Tz,Tz,t) * [M(z,Tz,t) + M(z,Tz,t)]/2\}$

and

$N(z,Tz,kt) \leq \max\{N(z,Tz,t) \Diamond N(z,Tz,t) \Diamond M(Tz,Tz,t) \Diamond [N(z,Tz,t) + N(z,Tz,t)]/2\}$

i.e.$M(z,Tz,kt) \geq M(z,Tz,t)$ and

$N(z,Tz,kt) \leq N(z,Tz,t)$

Therefore z=Tz=Sz=Qz

Hence z=Az=Bz=Pz=Sz=Qz=Tz.

Uniqueness: Let w be another fixed point of A, B, P, S, Q and T. Then

Put x=u,y=w in (2),we have

$M(Pu,Qw,kt) \geq \min\{M(STu,ABw,t) * M(STu,Qw,t) * M(Qw,ABw,t) * [M(Pu,ABw,t) + M(Pu,STw,t)]/2\}$

and

$N(Pu,Qw,kt) \leq \max\{N(STu,ABw,t) \Diamond N(STu,Qw,t) \Diamond M(Qw,ABw,t) \Diamond [N(Pu,ABw,t) + N(Pu,STw,t)]/2\}$

$M(u,w,kt) \geq \min\{M(u,w,t) * M(u,w,t) * M(w,w,t) * [M(u,w,t) + M(u,w,t)]/2\}$

and

$N(u,w,kt) \leq \max\{N(u,w,t) \Diamond N(u,w,t) \Diamond M(w,w,t) \Diamond [N(u,w,t) + N(u,w,t)]/2\}$

i.e.$M(u,w,kt) \geq M(u,w,t)$ and

$N(u,w,kt) \leq N(u,w,t)$

Hence u=w $\Rightarrow$z=u=w.

IV. CONCLUSION

Theorem 3.1 is a generalization of the result of Ranadive and Chauhan [6] and in the sense that employing the notion of semi-compatible and reciprocal continuity. Our result stronger than that Ranadive and Chauhan[6] we extend the above result of intuitionistic fuzzy metric space using absorbing maps.

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