ADV MATH SCI JOURNAL
Advances in Mathematics: Scientific Journal **9** (2020), no.12, 10189–10194
ISSN: 1857-8365 (printed); 1857-8438 (electronic)
https://doi.org/10.37418/amsj.9.12.11 Spec. Iss. on AMABDA-2020

# FIXED POINT THEOREMS IN SOFT PARAMETRIC METRIC SPACE

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ABSTRACT. In the present paper, some fixed-point theorems are proved in soft complete soft parametric metric space for rational expressions.

## 1. PRELIMINARIES

In this section we present some basic definition of soft parametric space. Details can be found in [1-10].

**Definition 1.1.** *A mapping $\tilde{\rho} : SP(\widetilde{X}) \times SP(\widetilde{X}) \times (0,\infty) \to \mathbb{R}(E)^*$, is said to be a soft parametric metric on the soft set $\widetilde{X}$ if $\tilde{\rho}$ satisfies the following conditions:*

(M1) $\tilde{\rho}\left(\tilde{x}_{e_1}, \tilde{y}_{e_2}, t\right) = \overline{0}$ *if and only if* $\tilde{x}_{e_1} = \tilde{y}_{e_2}$ *for all* $t > 0$*;*

(M2) $\tilde{\rho}\left(\tilde{x}_{e_1}, \tilde{y}_{e_2}, t\right) = \tilde{\rho}\left(\tilde{y}_{e_2}, \tilde{x}_{e_1}, t\right)$ *for all* $\tilde{x}_{e_1}, \tilde{y}_{e_2} \tilde{\in} \widetilde{X}$ *and* $t > 0$*,* $\tilde{x}_{e_1}, \tilde{y}_{e_2}, \tilde{z}_{e_3} \tilde{\in} \widetilde{X}$, $t > 0$*;*

(M3) $\tilde{\rho}\left(\tilde{x}_{e_1}, \tilde{z}_{e_3}, t\right) \tilde{\leq} \tilde{\rho}\left(\tilde{x}_{e_1}, \tilde{y}_{e_2}, t\right) + \tilde{\rho}\left(\tilde{y}_{e_2}, \tilde{z}_{e_3}, t\right)$ *for all* $\tilde{x}_{e_1}, \tilde{y}_{e_2}, \tilde{z}_{e_3} \tilde{\in} \widetilde{X}, t > 0$ *and the pair* $(\widetilde{X}, \tilde{\rho}, E)$ *is called soft parametric metric space.*

**Definition 1.2.** *Let $\{\tilde{x}^n_{\lambda_n}\}_{n=1}^{\infty}$ be a sequence in a Soft parametric metric space $(\widetilde{X}, \tilde{p}, E)$.*

(i) $\left\{\tilde{x}^n_{\lambda_n}\right\}_{n=1}^{\infty}$ *is said to be convergent to* $\tilde{x}_\lambda \in \widetilde{X}$, *if* $\lim_{n\to\infty} \tilde{\rho}\left(\tilde{x}^n_{\lambda_n}, \tilde{x}_\lambda, t\right) = 0$ *written as* $\lim_{n\to\infty} \tilde{x}^n_{\lambda_n} = \tilde{x}_\lambda$, *for all* $t > 0$*;*

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2020 *Mathematics Subject Classification.* 47H10, 65Z05.

*Key words and phrases.* Soft Parametric metric space, Soft Metric Space, Convergent Sequence, fixed point.

(ii) $\left\{\tilde{x}^n_{\lambda_n}\right\}_{n=1}^{\infty}$ *is said to be a Cauchy sequence in* $\widetilde{X}$, *if* $\lim_{n,m\to\infty}\tilde{\rho}\left(\tilde{x}^n_{\lambda_n},\tilde{x}^m_{\lambda_m},t\right)=0$ *for all* $t>0$*;*

(iii) $(\widetilde{X},\tilde{\rho},E)$ *is said to be complete if every Cauchy sequence is a convergent sequence.*

**Definition 1.3.** *Let* $(\widetilde{X},\tilde{\rho},E)$ *be a Soft parametric metric space and a function* $(f,\varphi):(\widetilde{X},\tilde{\rho},E)\to(\widetilde{X},\tilde{\rho},E)$ *is continuous at* $\tilde{x}_\lambda\in\widetilde{X}$, *if for any sequence* $\left\{\tilde{x}^n_{\lambda_n}\right\}_{n=1}^{\infty}$ *in* $\widetilde{X}$ *such that* $\lim_{n\to\infty}\tilde{x}^n_{\lambda_n}=\tilde{x}_\lambda$, *then* $\lim_{n\to\infty}(f,\varphi)\tilde{x}^n_{\lambda_n}=(f,\varphi)\tilde{x}_\lambda$

**Lemma 1.1.** *Let* $\left\{\tilde{x}^n_{\lambda_n}\right\}_{n=1}^{\infty}$ *be a sequence in a Soft parametric metric space* $(\widetilde{X},\tilde{\rho},E)$ *such that*

$$\tilde{\rho}\left(\tilde{x}^n_{\lambda_n},\tilde{x}^{n+1}_{\lambda_{n+1}},t\right)\le r\tilde{\rho}\left(\tilde{x}^{n-1}_{\lambda_{n-1}},\tilde{x}^n_{\lambda_n},t\right),$$

*where* $r\in[0,1)$ *and* $n=1,2,\ldots$. *Then* $\left\{\bar{x}^n_{\lambda_n}\right\}_{n=1}^{\infty}$ *is a Cauchy sequence in* $(\widetilde{X},\tilde{\rho},E)$

## 2. Main Results

**Theorem 2.1.** *Let* $(\widetilde{X},\tilde{\rho},E)$ *be a complete soft parametric metric space and let* $(f,\varphi)$ *a continuous mapping. Let mapping* $(f,\varphi):(\widetilde{X},\tilde{\rho},E)\to(\widetilde{X},\tilde{\rho},E)$ *is defined such that for all* $\tilde{x}_\lambda,\tilde{y}_\mu\in\widetilde{X},\tilde{x}_\lambda\neq\tilde{y}_\mu$, *and for all* $t>0$, *where* $\tilde{a}\in\left[0,\frac{1}{2}\right)$. *Then* $(f,\varphi)$ *has a unique fixed point in* $\widetilde{X}$, *if satisfies the following condition:*

$$\tilde{\rho}\left((f,\varphi)\tilde{x}_\lambda,(f,\varphi)\tilde{y}_\mu,t\right)\le\tilde{a}\max\left[\begin{array}{c}\tilde{\rho}\left(\tilde{x}_\lambda,\tilde{y}_\mu,t\right),\tilde{\rho}\left(\tilde{x}_\lambda,(f,\varphi)\tilde{x}_\lambda,t\right)\\ \tilde{\rho}\left(\tilde{y}_\mu,(f,\varphi)\tilde{y}_\mu,t\right),\tilde{\rho}\left(\tilde{x}_\lambda,(f,\varphi)\tilde{y}_\mu,t\right),\\ \tilde{\rho}\left((f,\varphi)\tilde{x}_\lambda,\tilde{y}_\mu,t\right),\frac{\tilde{\rho}(\tilde{x}_\lambda,(f,\varphi)\tilde{x}_\lambda,t)\cdot\tilde{\rho}(\tilde{y}_\mu,(f,\varphi)\tilde{y}_\mu,t)}{1+\tilde{\rho}((f,\varphi)\tilde{x}_\lambda,(f,\varphi)\tilde{y}_\mu,t)}\end{array}\right].$$

*Proof.* Let $\tilde{x}^0_\lambda$ be any soft point in $SP(X)$. Set

$$\begin{aligned}\tilde{x}^1_{\lambda_1}&=(f,\varphi)\left(\tilde{x}^0_\lambda\right)=\left(f\left(\tilde{x}^0_\lambda\right)\right)_{\varphi(\lambda)}\\ \tilde{x}^2_{\lambda_2}&=(f,\varphi)\left(\tilde{x}^1_{\lambda_1}\right)=\left(f^2\left(\tilde{x}^0_\lambda\right)\right)_{\varphi^2(\lambda)}\\ \tilde{x}^{n+1}_{\lambda_{n+1}}&=(f,\varphi)\left(\tilde{x}^n_{\lambda_n}\right)=\left(f^{n+1}\left(\tilde{x}^0_\lambda\right)\right)_{\varphi^{n+1}(\lambda)}.\end{aligned}$$

Now consider

$$\tilde{\rho}\left(\tilde{x}^n_{\lambda_n},\tilde{x}^{n+1}_{\lambda_{n+1}},t\right)=\tilde{\rho}\left((f,\varphi)\left(\tilde{x}^{n-1}_{\lambda_{n-1}}\right),(f,\varphi)\left(\tilde{x}^n_{\lambda_n}\right),t\right)$$

$$\leq \tilde{a}\max\left[\begin{array}{c}\tilde{\rho}\left(\tilde{x}^{n-1}_{\lambda_{n-1}},\tilde{x}^{n}_{\lambda_n},t\right),\tilde{\rho}\left(\tilde{x}^{n-1}_{\lambda_{n-1}},(f,\varphi)\tilde{x}^{n-1}_{\lambda_{n-1}},t\right)\\ \tilde{\rho}\left(\tilde{x}^{n}_{\lambda_n},(f,\varphi)\tilde{x}^{n}_{\lambda_n},t\right)\\ \tilde{\rho}\left(\tilde{x}^{n-1}_{\lambda_{n-1}},(f,\varphi)\tilde{x}^{n}_{\lambda_n},t\right),\tilde{\rho}\left((f,\varphi)\tilde{x}^{n-1}_{\lambda_{n-1}},\tilde{x}^{n}_{\lambda_n},t\right)\\ \frac{\tilde{\rho}\left(\tilde{x}^{n-1}_{\lambda_{n-1}},(f,\varphi)\tilde{x}^{n-1}_{\lambda_{n-1}},t\right)\cdot\tilde{\rho}\left(\tilde{x}^{n}_{\lambda_n},(f,\varphi)\tilde{x}^{n}_{\lambda_n},t\right)}{1+\tilde{\rho}\left((f,\varphi)\tilde{x}^{n-1}_{\lambda_{n-1}},(f,\varphi)\tilde{x}^{n}_{\lambda_n},t\right)}\end{array}\right]$$

$$\leq \tilde{a}\max\left[\begin{array}{c}\tilde{\rho}\left(\tilde{x}^{n-1}_{\lambda_{n-1}},\tilde{x}^{n}_{\lambda_n},t\right),\tilde{\rho}\left(\tilde{x}^{n-1}_{\lambda_{n-1}},\tilde{x}^{n}_{\lambda_n},t\right)\\ \tilde{\rho}\left(\tilde{x}^{n}_{\lambda_n},\tilde{x}^{n+1}_{\lambda_{n+1}},t\right)\\ \tilde{\rho}\left(\tilde{x}^{n-1}_{\lambda_{n-1}},\tilde{x}^{n+1}_{\lambda_{n+1}},t\right),\tilde{\rho}\left(\tilde{x}^{n}_{\lambda_n},\tilde{x}^{n}_{\lambda_n},t\right)\\ \frac{\tilde{\rho}\left(\tilde{x}^{n-1}_{\lambda_{n-1}},\tilde{x}^{n}_{\lambda_n},t\right)\cdot\tilde{\rho}\left(\tilde{x}^{n}_{\lambda_n},\tilde{x}^{n+1}_{\lambda_{n+1}}t\right)}{1+\tilde{\rho}\left(\tilde{x}^{n}_{\lambda_n},\tilde{x}^{n+1}_{\lambda_{n+1}},t\right)}\end{array}\right]$$

$$\tilde{\rho}\left(\tilde{x}^{n}_{\lambda_n},\tilde{x}^{n+1}_{\lambda_{n+1}},t\right)\leq \tilde{a}\max\left[\begin{array}{c}\tilde{\rho}\left(\tilde{x}^{n-1}_{\lambda_{n-1}},\tilde{x}^{n}_{\lambda_n},t\right),\tilde{\rho}\left(\tilde{x}^{n}_{\lambda_n},\tilde{x}^{n+1}_{\lambda_{n+1}},t\right)\\ \tilde{\rho}\left(\tilde{x}^{n-1}_{\lambda_{n-1}},\tilde{x}^{n+1}_{\lambda_{n+1}},t\right)\end{array}\right]$$

**Case I:**. If $\max\left[\begin{array}{c}\tilde{\rho}\left(\tilde{x}^{n-1}_{\lambda_{n-1}},\tilde{x}^{n}_{\lambda_n},t\right),\tilde{\rho}\left(\tilde{x}^{n}_{\lambda_n},\tilde{x}^{n+1}_{\lambda_{n+1}},t\right)\\ \tilde{\rho}\left(\tilde{x}^{n-1}_{\lambda_{n-1}},\tilde{x}^{n+1}_{\lambda_{n+1}},t\right)\end{array}\right]=\tilde{\rho}\left(\tilde{x}^{n-1}_{\lambda_{n-1}},\tilde{x}^{n}_{\lambda_n},t\right)$ then

$$\begin{array}{c}\tilde{\rho}\left(\tilde{x}^{n}_{\lambda_n},\tilde{x}^{n+1}_{\lambda_{n+1}},t\right)\leq\tilde{a}\tilde{\rho}\left(\tilde{x}^{n-1}_{\lambda_{n-1}},\tilde{x}^{n}_{\lambda_n},t\right),\\ \tilde{\rho}\left(\tilde{x}^{n}_{\lambda_n},\tilde{x}^{n+1}_{\lambda_{n+1}},t\right)\leq\tilde{a}^n\tilde{\rho}\left(\tilde{x}^{0}_{\lambda_0},\tilde{x}^{1}_{\lambda_1},t\right)\end{array}.$$

It is clear by the basic lemmas sequence $\{\tilde{x}^{n}_{\lambda_n}\}$ is a Cauchy sequence in $\widetilde{X}$. But $\widetilde{X}$ is a complete soft parametric metric space, hence $\{\tilde{x}^{n}_{\lambda_n}\}$ is converges. here is $\tilde{x}^*_\lambda\in\widetilde{X}$ such as $\tilde{x}^{n}_{\lambda_n}\to\tilde{x}^*_\lambda, n\to\infty$.

By continuity of $t$ we have:

$$(f,\varphi)\tilde{x}^*_\lambda=(f,\varphi)\left(\lim_{n\to\infty}\tilde{x}^{n}_{\lambda_n}\right)=\lim_{n\to\infty}(f,\varphi)\tilde{x}^{n}_{\lambda_n}=\lim_{n\to\infty}\tilde{x}^{n+1}_{\lambda_{n+1}}=\tilde{x}^*_\lambda,$$

i.e., $(f,\varphi)\tilde{x}^*_\lambda=\tilde{x}^*_\lambda$. Thus, $(f,\varphi)$ is a fixed point in $\widetilde{X}$.

**Case II:**. If

$$\max\left[\tilde{\rho}\left(\tilde{x}^{n-1}_{\lambda_{n-1}},\tilde{x}^{n}_{\lambda_n},t\right),\tilde{\rho}\left(\tilde{x}^{n}_{\lambda_n},\tilde{x}^{n+1}_{\lambda_{n+1}},t\right),\tilde{\rho}\left(\tilde{x}^{n-1}_{\lambda_{n-1}},\tilde{x}^{n+1}_{\lambda_{n+1}},t\right)\right]=\tilde{\rho}\left(\tilde{x}^{n}_{\lambda_n},\tilde{x}^{n+1}_{\lambda_{n+1}},t\right),$$

then

$$\tilde{\rho}\left(\tilde{x}^{n}_{\lambda_n},\tilde{x}^{n+1}_{\lambda_{n+1}},t\right)\leq\tilde{a}\tilde{\rho}\left(\tilde{x}^{n}_{\lambda_n},\tilde{x}^{n+1}_{\lambda_{n+1}},t\right),$$

since $0\leq\tilde{a}<\frac{1}{2}$, which gives contradiction.

**Case III:**. If

$$\max\left[\tilde{\rho}\left(\tilde{x}^{n-1}_{\lambda_{n-1}},\tilde{x}^{n}_{\lambda_n},t\right),\tilde{\rho}\left(\tilde{x}^{n}_{\lambda_n},\tilde{x}^{n+1}_{\lambda_{n+1}},t\right),\tilde{\rho}\left(\tilde{x}^{n-1}_{\lambda_{n-1}},\tilde{x}^{n+1}_{\lambda_{n+1}},t\right)\right]=\tilde{\rho}\left(\tilde{x}^{n-1}_{\lambda_{n-1}},\tilde{x}^{n+1}_{\lambda_{n+1}},t\right),$$

then

$$\tilde{\rho}\left(\tilde{x}^{n}_{\lambda_n},\tilde{x}^{n+1}_{\lambda_{n+1}},t\right)\leq\tilde{a}\tilde{\rho}\left(\tilde{x}^{n-1}_{\lambda_{n-1}},\tilde{x}^{n+1}_{\lambda_{n+1}},t\right)\leq\tilde{a}\left[\tilde{\rho}\left(\tilde{x}^{n-1}_{\lambda_{n-1}},\tilde{x}^{n}_{\lambda_n},t\right)+\tilde{\rho}\left(\tilde{x}^{n}_{\lambda_n},\tilde{x}^{n+1}_{\lambda_{n+1}},t\right)\right]$$

$$\leq\left(\frac{\tilde{a}}{1-\tilde{a}}\right)\tilde{\rho}\left(\tilde{x}^{n-1}_{\lambda_{n-1}},\tilde{x}^{n}_{\lambda_n},t\right)\leq k\tilde{\rho}\left(\tilde{x}^{n-1}_{\lambda_{n-1}},\tilde{x}^{n}_{\lambda_n},t\right),$$

where $k=\left(\frac{\tilde{a}}{1-\tilde{a}}\right)$ and

$$\tilde{\rho}\left(\tilde{x}^{n}_{\lambda_n},\tilde{x}^{n+1}_{\lambda_{n+1}},t\right)\leq k^n\tilde{\rho}\left(\tilde{x}^{0}_{\lambda_0},\tilde{x}^{1}_{\lambda_1},t\right).$$

Sequence $\left\{\tilde{x}^{n}_{\lambda_n}\right\}$ is a Cauchy sequence in $\widetilde{X}$. But $\widetilde{X}$ is a complete soft parametric metric space, hence $\left\{\tilde{x}^{n}_{\lambda_n}\right\}$ is converges. Here is $\tilde{x}^*_\lambda\in\widetilde{X}$ such that $\tilde{x}^{n}_{\lambda_n}\to\tilde{x}^*_\lambda, n\to\infty$.

By continuity of $(f,\varphi)$ we have,

$$(f,\varphi)\tilde{x}^*_\lambda=(f,\varphi)\left(\lim_{n\to\infty}\tilde{x}^{n}_{\lambda_n}\right)=\lim_{n\to\infty}(f,\varphi)\tilde{x}^{n}_{\lambda_n}=\lim_{n\to\infty}\tilde{x}^{n+1}_{\lambda_{n+1}}=\tilde{x}^*_\lambda,$$

i.e., $(f,\varphi)\tilde{x}^*_\lambda=\tilde{x}^*_\lambda$. Thus, $(f,\varphi)$ is a fixed point in $\widetilde{X}$.

**Uniqueness.** Let $\tilde{y}^*_\mu$ is another fixed point of $(f,\varphi)$ in $\widetilde{X}$ such that $\tilde{x}^*_\lambda\neq\tilde{y}^*_\mu$, then we have

$$\tilde{\rho}\left((f,\varphi)\tilde{x}^*_\lambda,(f,\varphi)\tilde{y}^*_\mu,t\right)\leq\tilde{a}\max\begin{bmatrix}\tilde{\rho}\left(\tilde{x}^*_\lambda,\tilde{y}^*_\mu,t\right),\tilde{\rho}\left(\tilde{x}^*_\lambda,(f,\varphi)\tilde{x}^*_\lambda,t\right)\\ \tilde{\rho}\left(\tilde{y}^*_\mu,(f,\varphi)\tilde{y}^*_\mu,t\right),\tilde{\rho}\left(\tilde{x}^*_\lambda,(f,\varphi)\tilde{y}^*_\mu,t\right)\\ \tilde{\rho}\left((f,\varphi)\tilde{x}^*_\lambda,\tilde{y}^*_\mu,t\right),\frac{\tilde{\rho}\left(\tilde{x}^*_\lambda,(f,\varphi)\tilde{x}^*_\lambda,t\right)\cdot\tilde{\rho}\left(\tilde{y}^*_\mu,(f,\varphi)\tilde{y}^*_\mu,t\right)}{1+\tilde{\rho}\left((f,\varphi)\tilde{x}^*_\lambda,(f,\varphi)\tilde{y}^*_\mu,t\right)}\end{bmatrix}$$

$$\leq\tilde{a}\max\begin{bmatrix}\tilde{\rho}\left(\tilde{x}^*_\lambda,\tilde{y}^*_\mu,t\right),\tilde{\rho}\left(\tilde{x}^*_\lambda,\tilde{x}^*_\lambda,t\right)\\ \tilde{\rho}\left(\tilde{y}^*_\mu,\tilde{y}^*_\mu,t\right),\tilde{\rho}\left(\tilde{x}^*_\lambda,\tilde{y}^*_\mu,t\right)\\ \tilde{\rho}\left(\tilde{x}^*_\lambda,\tilde{y}^*_\mu,t\right),\frac{\tilde{\rho}\left(\tilde{x}^*_\lambda,\tilde{x}^*_\lambda,t\right)\cdot\tilde{\rho}\left(\tilde{y}^*_\mu,\tilde{y}^*_\mu,t\right)}{1+\tilde{\rho}\left(\tilde{x}^*_\lambda,\tilde{y}^*_\mu,t\right)}\end{bmatrix}$$

and

$$\tilde{\rho}\left((f,\varphi)\tilde{x}^*_\lambda,(f,\varphi)\tilde{y}^*_\mu,t\right)\leq\tilde{a}\tilde{\rho}\left(\tilde{x}^*_\lambda,\tilde{y}^*_\mu,t\right).$$

This is true only when $\tilde{\rho}\left(\tilde{x}^*_\lambda,\tilde{y}^*_\mu,t\right)=0\Rightarrow\tilde{x}^*_\lambda=\tilde{y}^*_\mu$. Hence, fixed point of $(f,\varphi)$ is unique. □

**Theorem 2.2.** *Let $(\widetilde{X},\tilde{p},E)$ be a complete soft parametric metric space and let $(f,\varphi)$ a continuous mapping.*

Let mapping $(f,\varphi):(\widetilde{X},\tilde{\rho},E)\to(\widetilde{X},\tilde{\rho},E)$ satisfies the following condition:

$$\begin{aligned}\tilde{\rho}\left((f,\varphi)\tilde{x}_\lambda,(f,\varphi)\tilde{y}_\mu,t\right)\leq\tilde{a}\left[\tilde{\rho}\left(\tilde{x}_\lambda,(f,\varphi)\tilde{x}_\lambda,t\right)+\tilde{\rho}\left(\tilde{y}_\mu,(f,\varphi)\tilde{y}_\mu,t\right)\right]\\+\tilde{b}\left[\tilde{\rho}\left(\tilde{x}_\lambda,(f,\varphi)\tilde{y}_\mu,t\right)+\tilde{\rho}\left((f,\varphi)\tilde{x}_\lambda,\tilde{y}_\mu,t\right)\right],\end{aligned}$$

for all $\tilde{x}_\lambda,\tilde{y}_\mu\in\widetilde{X},\tilde{x}_\lambda\neq\tilde{y}_\mu$ and for all $t>0$, where $\tilde{a}+\tilde{b}<\frac{1}{2},\tilde{a},\tilde{b}\in\left[0,\frac{1}{2}\right)$ Then $(f,\varphi)$ has a unique fixed point in $\widetilde{X}$.

**Theorem 2.3.** *Let* $(\widetilde{X},\tilde{p},E)$ *be a complete soft parametric metric space and let* $(f,\varphi)$ *a continuous mapping.*

Let mapping $(f,\varphi):(\widetilde{X},\tilde{\rho},E)\to(\widetilde{X},\tilde{\rho},E)$ satisfies the following condition:

$$\begin{aligned}&\tilde{\rho}\left((f,\varphi)\tilde{x}_\lambda,(f,\varphi)\tilde{y}_\mu,t\right)\\&\leq\tilde{a}\left[\frac{\tilde{\rho}\left(\tilde{y}_\mu,(f,\varphi)\tilde{y}_\mu,t\right)\cdot\left\{\tilde{\rho}\left(\tilde{y}_\mu,(f,\varphi)\tilde{x}_\lambda,t\right)+\tilde{\rho}\left(\tilde{x}_\lambda,(f,\varphi)\tilde{y}_\mu,t\right)\right\}}{1+\tilde{\rho}\left(\tilde{x}_\lambda,(f,\varphi)\tilde{x}_\lambda,t\right)+\tilde{\rho}\left(\tilde{y}_\mu,(f,\varphi)\tilde{y}_\mu,t\right)}\right]\\&+\tilde{b}\left[\tilde{\rho}\left(\tilde{x}_\lambda,\tilde{y}_\mu,t\right)\right],\end{aligned}$$

for all $\tilde{x}_\lambda,\tilde{y}_\mu\in\widetilde{X},\tilde{x}_\lambda\neq\tilde{y}_\mu$, and for all $t>0$, where $\tilde{a}+\tilde{b}<1,\tilde{a},\tilde{b}\in(0,1)$. Then $(f,\varphi)$ has a unique fixed point in $\widetilde{X}$.

**Theorem 2.4.** *Let* $(\widetilde{X},\tilde{p},E)$ *be a complete soft parametric metric space and let* $(f,\varphi)$ *a continuous mapping.*

Let mapping $(f,\varphi):(\widetilde{X},\tilde{\rho},E)\to(\widetilde{X},\tilde{\rho},E)$ satisfies the following condition:

$$\begin{aligned}&\tilde{\rho}\left((f,\varphi)\tilde{x}_\lambda,(f,\varphi)\tilde{y}_\mu,t\right)+\tilde{a}\max\left\{\tilde{\rho}\left(\tilde{x}_\lambda,(f,\varphi)\tilde{y}_\mu,t\right),\tilde{\rho}\left(\tilde{y}_\mu,(f,\varphi)\tilde{x}_\lambda,t\right)\right\}\\&\geq\tilde{b}\frac{\tilde{\rho}\left(\tilde{x}_\lambda,(f,\varphi)\tilde{x}_\lambda,t\right)\left[1+\tilde{\rho}\left(\tilde{y}_\mu,(f,\varphi)\tilde{y}_\mu,t\right)\right]}{1+\tilde{\rho}\left(\tilde{x}_\lambda,\tilde{y}_\mu,t\right)}+\tilde{c}\tilde{\rho}\left(\tilde{x}_\lambda,\tilde{y}_\mu,t\right),\end{aligned}$$

for all $\tilde{x}_\lambda,\tilde{y}_\mu\in\widetilde{X},\tilde{x}_\lambda\neq\tilde{y}_\mu$ and for all $t>0$, where $\tilde{a},\tilde{b},\tilde{c}\geq0\&\tilde{b}+\tilde{c}-2\tilde{a}>1,\tilde{c}-\tilde{a}>1$. Then $(f,\varphi)$ has a unique fixed point in $\widetilde{X}$.

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