A FIXED POINT THEOREM ON ENRICHED (ψ, φ_λ)-WEAKLY CONTRACTIVE MAPS IN CONVEX METRIC SPACES

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Abstract: In this paper, we define enriched (ψ, φ_λ)-weakly contractive map in convex metric spaces where ψ is continuous on $[0, +\infty)$ and φ_λ is not continuous on $[0, +\infty)$ and prove the existence and uniqueness of fixed points of these maps in complete convex metric spaces. We provide an example in support of our result.

Keywords and Phrases: Contraction, enriched contraction, (λ, c)-enriched contraction, enriched (ψ, φ_λ)-weakly contractive map.

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1. Introduction

Weakly contractive maps in Hilbert spaces were introduced by Alber and Guerre-Delabriere [2] as a generalization of contraction maps and they established the existence of fixed points in Hilbert spaces. Rhoades [11] extended it to the setting of metric spaces.

Definition 1. (Rhoades [11]) *Let (X, d) be a metric space. A map $T : X \to X$ is said to be weakly contractive if*

$$d(Tx, Ty) \leq d(x, y) - \varphi(d(x, y)) \tag{1}$$

for all $x, y \in X$, where $\varphi : [0, +\infty) \to [0, +\infty)$ is continuous, monotone nondecreasing with $\varphi(t) = 0$ if and only if $t = 0$.