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Best proximity points for cyclic generalized contractions

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Abstract

In this paper we introduce cyclic generalized contraction maps and the theorems asked about it. Moreover, we obtain existence and convergence of best proximity points for this mappings in uniformly convex Banach space.

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1 Introduction

Let A and B be two nonempty subsets of a X. A map $T : A \cup B \to A \cup B$ is called a cyclic map if $T(A) \subseteq B$ and $T(B) \subseteq A$. Let (X, d) be a metric space and $T : A \cup B \to A \cup B$ a cyclic map. For any two nonempty subsets A and B of X, let

$$d(A, B) = inf\{d(x, y) : x \in A \text{ and } y \in B\}.$$

A point $x \in A \cup B$ is called to be a best proximity point for T if

$$d(x, Tx) = d(A, B).$$

Throughout this paper. We denote by **N** and **R** the sets of positive integers and real numbers, respectively. Recently, the existence, uniqueness and convergence of iterates to the best proximity point were investigated by many authors; see [1-5,8-9]. In 2006, Eldred and Veeramani [4] first gave the concept of cyclic contraction as follows.

Definition 1.1. [4] Let A and B be nonempty subsets of a metric space (X, d). $T : A \cup B \to A \cup B$ is a cyclic contraction map if it satisfies
(1) $T(A) \subseteq B$ and $T(B) \subseteq A$.
(2) there exists $k \in (0, 1)$ such that

$$d(Tx, Ty) \leq kd(x, y) + (1 - k)d(A, B)$$

for all $x \in A$, $y \in B$.

Example 1.2. [4] Given k in $(0, 1)$, let A and B be subsets of l^p,$1 \leq p \leq \infty$, defined by $A = \{((1 + k^{2n})e_{2n}) : n \in N\}$ and $B = \{((1 + k^{2m-1})e_{2m-1}) : m \in N\}$. Suppose

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