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Generalized cyclic contraction and convex structure

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Abstract

In this paper we consider approximate proximity pair for a single map. We apply approximate fixed point for a map and discuss the existence of approximate proximity pair. Approximation theory, which mainly consists of theory of nearest points (best approximation) and theory of farthest points (worst approximation), is an old and rich branch of analysis. The theory is as old as Mathematics itself. The ancient Greeks approximated the area of a closed curve by the area of a polygon. Starting in 1853, Russian mathematician P.L. Chebyshev made significant contributions in the theory of best approximation.

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1 Introduction

Let (X, d) be a metric space, A, B nonempty subsets of X and $d(A, B)$ is the distance of A and B,

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

If $d(x_0, y_0) = d(A, B)$, then the pair (x_0, y_0) is called a best proximity pair for A and B and put

$$prox(A, B) = \{(x, y) \in A \times B : \ d(x, y) = d(A, B)\} \qquad (1.1)$$

as the set of all best proximity pairs for (A, B) (see[1-5]).

Definition 1.1. [3] Let (X, d) be a metric space, $T : X \to X$, $\epsilon > 0$ and $x_0 \in X$. Then x_0 is an ϵ-fixed point (approximate fixed point) of T if

$$d(T(x_0), x_0) < \epsilon$$

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