Dynamics of Continuous, Discrete and Impulsive Systems
Series **A:** *Mathematical Analysis* **25 (2018)** 111-124
 http://www.watam.org

A NEW TWO-STEP ITERATION PROCESS FOR NONEXPANSIVE MAPPINGS IN CAT(κ) SPACES

Prasit Cholamjiak[a,1], Raweerote Suparatulatorn[b] and Suthep Suantai[b]

[a]School of Science
University of Phayao, Phayao 56000, Thailand

[b]Centre of Excellence in Mathematics and Applied Mathematics
Department of Mathematics, Faculty of Science
Chiang Mai University, Chiang Mai 50200, Thailand

Abstract. We establish Δ-convergence results of a sequence generated by a new two-step iteration process for nonexpansive mappings in complete CAT(κ) spaces. Some numerical examples are also provided to compare with Ishikawa iteration process. Our main result extends the corresponding results in the literature.

Keywords. Δ-convergence; new two-step iteration process; nonexpansive mapping; fixed point; CAT(κ) space.

AMS (MOS) subject classification: 47H09; 47H10.

1 Introduction

Let C be a nonempty subset of a metric space (X, d). A mapping $T : C \to C$ is said to be nonexpansive if

$$d(Tx, Ty) \leq d(x, y)$$

for all $x, y \in C$. We say that $x \in C$ is a fixed point of T if

$$Tx = x.$$

We denote the set of all fixed points of T by $Fix(T)$.

The concept of Δ-convergence in general metric spaces was introduced by Lim [1]. Kirk [2] has proved the existence of fixed point of nonexpansive mappings in CAT(0) spaces. Kirk and Panyanak [3] specialized this concept to CAT(0) spaces and showed that many Banach space results involving weak convergence have precise analogs in this setting. Dhompongsa and Panyanak [4] continued to work in this direction. Their results involved the Mann and Ishikawa iteration process. Panyanak and Laokul [5] also studied involved the Ishikawa iteration process in CAT(0) spaces.

[1]Corresponding author: prasitch2008@yahoo.com (P. Cholamjiak)