

ITERATIVE ALGORITHMS FOR A FINITE FAMILY OF ASYMPTOTICALLY NONEXPANSIVE MAPPINGS

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Abstract. In this paper, we suggest and analyze an iterative algorithm for a finite family of asymptotically nonexpansive mappings. We study the convergence problem of the proposed iterative algorithm for a finite family of asymptotically nonexpansive mappings under some mild conditions in Banach spaces.

Keywords. Asymptotically nonexpansive mapping; Nonexpansive mapping; Fixed point; Iterative algorithm; Banach limit; Strong convergence.

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1 Introduction

Let C be a nonempty closed convex subset of a real Banach space E . Recall that a mapping $f : C \rightarrow C$ is called a contraction if there exists a constant $\alpha \in [0, 1)$ such that

$$\|f(x) - f(y)\| \leq \alpha \|x - y\|$$

for all $x, y \in C$. Let $T : C \rightarrow C$ be a mapping and $F(T)$ denote the set of fixed points of T . The mapping T is said to be nonexpansive if

$$\|Tx - Ty\| \leq \|x - y\|$$

for all $x, y \in C$. The mapping T is called asymptotically nonexpansive if, for a sequence $\{k_n\} \subset [1, \infty)$ with $k_n \rightarrow 1$ as $n \rightarrow \infty$,

$$\|T^n x - T^n y\| \leq k_n \|x - y\|$$

for all $x, y \in C$ and $n \geq 1$.