



Approximate Fixed Point Theorem For Asymptotically Nonexpansive Mappings

S. A. M. Mohsenailhosseini*
Yazd University

Abstract

In this paper, we obtain the existence of approximate fixed points theorems for asymptotically nonexpansive mapping in a Banach space. Also we prove the set $AF(T)$ of approximate fixed points of T is closed and convex.

Keywords: Approximate fixed points, Asymptotically nonexpansive mappings, Uniformly convex Banach space.

Mathematics Subject Classification [2010]: 46A32, 46M05, 41A17

1 Introduction

Nowadays, fixed point and approximate fixed point play an important role in different areas of mathematics, and its applications, particularly in mathematics, differential equation and dynamic programming. Also, There are plenty of problems in applied mathematics which can be solved by means of fixed point theory. Still, practice proves that in many real situations an approximate solution is more than sufficient, so the existence of fixed points is not strictly required, but that of nearly fixed points. Another type of practical situations that lead to this approximation is when the conditions that have to be imposed in order to guarantee the existence of fixed points are far too strong for the real problem one has to solve.

In 1965, F. E. Browder [1] proved that every nonexpansive self-mapping of a closed convex and bounded subset of a uniformly convex Banach space has a fixed point. Also, This result was also obtained by W. A. Kirk [3].

In 1972 Goebel et al [2] extended Browder's result to a more general class of transformations which it shall call "asymptotically nonexpansive" mappings, and we give some approximate fixed points of such mappings.

Definition 1.1. [5] Let $(X, \|\cdot\|)$ be a completely norm space and $T : X \rightarrow X$ be a map. Then $x_0 \in X$ is ϵ -fixed point for T if $\|Tx_0 - x_0\| < \epsilon$.

*Speaker