Some Stability Theorems for Some Iteration Processes

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Abstract

In this paper, we obtain some stability results for Picard and Mann iteration processes in metric space and normed linear space respectively, using two different contractive definitions which are more general than those of Harder and Hicks [4], Rhoades [10, 11], Osilike [8], Osilike and Udomene [9], Berinde [1, 2], Imoru and Olatinwo [5] and Imoru et al [6].

Our results are generalizations of some results of Harder and Hicks [4], Rhoades [10, 11], Osilike [8], Osilike and Udomene [9], Berinde [1, 2], Imoru and Olatinwo [5] and Imoru et al [6].

Key words: Stability results; Picard and Mann iteration processes.

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1   Introduction

Let (X, d) be a complete metric space, $T : X \to X$ a selfmap of X. Suppose that $F_T = \{p \in X \mid Tp = p\}$ is the set of fixed points of T. Let $\{x_n\}_{n=0}^{\infty} \subset X$ be the sequence generated by an iteration procedure involving T which is defined by

$$x_{n+1} = f(T, x_n), \quad n = 0, 1, 2, \ldots \qquad (1)$$

where $x_0 \in X$ is the initial approximation and f is some function. Suppose $\{x_n\}_{n=0}^{\infty}$ converges to a fixed point p of T. Let $\{y_n\}_{n=0}^{\infty} \subset X$ and set

$$\epsilon_n = d(y_{n+1}, f(T, y_n)), \quad n = 0, 1, 2, \ldots$$