AN ITERATIVE ALGORITHM FOR FINDING A COMMON SOLUTION OF FIXED POINT PROBLEM AND SYSTEM OF EQUILIBRIUM PROBLEMS

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Abstract. Our aim in this paper is to prove strong convergence theorem for approximation of fixed point of a λ-strictly pseudo-contractive mapping which is also a common solution to a finite system of equilibrium problems in a real Hilbert space by modifying the iterative scheme of Li and Yao [M. Li, Y. Yao; Strong convergence of an iterative algorithm for λ-strictly pseudo-contractive mappings in Hilbert spaces, An. St. Univ. Ovidius Constanta 18 (1)(2010), 219-228]. Our result complements the result of Li and Yao in a real Hilbert space.

Keywords. Equilibrium problems; λ-strictly pseudocontractive mapping; strong convergence; Hilbert spaces, fixed point.

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1 Introduction

Let H be a real Hilbert space and K a nonempty, closed and convex subset of H. A mapping $T : K \to K$ is said to be *nonexpansive* if

$$||Tx - Ty|| \leq ||x - y||, \quad \forall \ x, y \in K, \tag{1}$$

and $T : K \to K$ is said to be λ-*strictly pseudocontractive* if for $0 \leq \lambda < 1$,

$$||Tx - Ty||^2 \leq ||x - y||^2 + \lambda ||(I - T)x - (I - T)y||^2, \quad \forall \ x, y \in K. \tag{2}$$

In a Hilbert space H, we can show that (2) is equivalent to

$$\langle Tx - Ty, x - y \rangle \leq ||x - y||^2 - \frac{1 - \lambda}{2} ||(I - T)x - (I - T)y||^2. \tag{3}$$

A point $x \in K$ is called a *fixed point* of T if $Tx = x$. The set of fixed points of T is denoted by $F(T)$.