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AN ITERATIVE ALGORITHM FOR APPROXIMATING A SOLUTION OF SPLIT COMMON FIXED POINT PROBLEM FOR DEMI-CONTRACTIVE MAPS

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Abstract. In this paper, we study convergence analysis of split common fixed point problems in the frame work of Hilbert space. We used a modified Mann iterative algorithm to approximate the solution of split common fixed point problem for demi-contractive mappings in a real Hilbert space and obtain a strong convergence result with no compactness assumptions on the space or the map and with no extra conditions on the fixed points set.

Keywords. split common fixed point problem; Demi-contractive mapping; strong convergence; Hilbert spaces.

AMS (MOS) subject classification: 47H06, 47H09, 47J05, 47J25.

1 Introduction

Let H be a real Hilbert space. A mapping $T : H \to H$ is said to be *nonexpansive* if

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

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

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

In a Hilbert space H, we can show that (1.2) is equivalent to

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

Let T be a mapping, then 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 $F(T)$. A mapping $T : K \to K$ is said to be *demicontractive*, if $\exists \beta \in [0, 1)$ such that

$$||Tx - q||^2 \leq ||x - q||^2 + \beta||x - Tx||^2, \quad \forall x \in H, q \in F(T). \tag{4}$$