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STRONG CONVERGENCE THEOREMS FOR SPLIT EQUALITY FIXED POINT PROBLEMS OF η-DEMIMETRIC MAPPINGS IN BANACH SPACES

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Abstract. The purpose of this paper is to propose and study an algorithm for solving the split equality fixed point problems of η-demimetric mappings in Banach spaces. Under some mild conditions we establish the norm convergence of the proposed algorithm. We apply these results to obtain new strong convergence theorems which are connected with the split feasibility problem, the split equality fixed point problem, and the split null point problem in Hilbert or Banach spaces. Our theorems extend or complement the results that have been proved for this important class of nonlinear operators.

Keywords. Demimetric mapping, Duality mapping; monotone mappings, split equality common fixed point problems, strong convergence, uniformly convex spaces; uniformly smooth spaces.

AMS (MOS) subject classification: 47H05, 47H09, 47H10

1. Introduction

Let C be a nonempty subset of a real Banach space E with its dual E^* and let $1 < p < \infty$. The *generalized duality* mapping from E into 2^{E^*} is defined by:

$$J_E^p(x) := \{f \in E^* : \langle x, f\rangle = \|x\|^p, \|f\| = \|x\|^{p-1}\},$$

where $\langle ., .\rangle$ denotes the duality pairing. In particular, $J_E^2 = J_E$ is called the *normalized duality mapping.* It is well-known (see for example ([29]) that J_E^p is single valued if E is smooth and that

$$J_E^p(x) = \|x\|^{p-2} J_E(x), \quad x \neq 0. \tag{1}$$

Furthermore, if E is uniformly smooth then J_E^p is uniformly continuous on bounded subsets of E. If E is a reflexive and strictly convex Banach space with a strictly convex dual, then $J_{E^*}^q : E^* \to 2^E$ is one-to-one, surjective, and it is the duality mapping from E^* into E and thus $J_E^p J_{E^*}^q = I_{E^*}$ and $J_{E^*}^q J_E^p = I_E$ (see, [12]), where $q > 1$ such that $\frac{1}{p} + \frac{1}{q} = 1$. Furthermore, if