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CONVERGENCE ANALYSIS OF ALGORITHMS FOR VARIATIONAL INEQUALITIES INVOLVING STRICTLY PSEUDO-CONTRACTIVE OPERATORS

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Abstract. The purpose of the present work is to analyze the convergence of two new viscosity iterative algorithms for finding common solutions to variational inequality problem and fixed point problem of a finite system of strictly pseudo-contractive operators in a q-uniformly smooth Banach space. Under suitable conditions, some strong convergence theorems are obtained. Using Matlab software, we numerically solve a convex feasibility problem. Our results improve some existing known results.

1. Introduction

Consider the well known convex feasibility problem (CFP):

$$\text{finding an } x \in \bigcap_{i=1}^{k} C_i \tag{1.1}$$

where $C_1, C_2, \ldots, C_k$ are intersecting closed convex subsets of a Banach space X. The CFP lies in center of many problems of mathematics and the physical sciences such as computerized tomography [14], radiation therapy treatment planning [7, 11, 15], sensor networking [3], image restoration [13]. A comprehensive study on algorithms for solving the CFP can be found in [2, 13].

Let X^* be dual of a real Banach space X. For $q > 1$, the generalized duality mapping $J_q : X \to 2^{X^*}$ is defined by

$$J_q(u) = \left\{u^* \in X^* : \langle u, u^* \rangle = \|u\|^q, \|u^*\| = \|u\|^{q-1}\right\}, \quad \forall\ u \in X,$$

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