CQ METHOD FOR APPROXIMATING FIXED POINTS OF NONEXPANSIVE SEMIGROUPS AND STRICTLY PSEUDO-CONTRACTIVE MAPPINGS

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ABSTRACT. We use the CQ method for approximating a common fixed point of a left amenable semigroup of nonexpansive mappings, an infinite family of strictly pseudo-contraction mappings and the set of solutions of variational inequalities for monotone, Lipschitz-continuous mappings in a real Hilbert space. Our results are a generalization of a result announced by Nadezhkina and Takahashi [N. Nadezhkina and W. Takahashi, Strong convergence theorem by a hybrid method for nonexpansive mappings and Lipschitz-continuous monotone mappings, SIAM J. Optim. 16 (2006), 1230–1241] and some other recent results.

1. Introduction

Let H be a real Hilbert space with inner product $\langle \cdot, \cdot \rangle$ and induced norm $\|\cdot\|$. Let C be a nonempty closed convex subset of H. A mapping T of C into itself is called nonexpansive if $\|Tx - Ty\| \leq \|x - y\|$, for all $x, y \in C$. By $\mathrm{ne}(C)$, we denote the set of all nonexpansive mappings of C into itself and by $\mathrm{Fix}(T)$, we denote the set of fixed points of T (i.e. $\mathrm{Fix}(T) = \{x \in C : Tx = x\}$), it is well known that $\mathrm{Fix}(T)$ is closed and convex. Let $A \colon C \to H$ be a nonlinear