A Forward-Backward Projection Algorithm for Approximating of the Zero of the Sum of Two Operators

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Extended Abstract

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Introduction

One of the most important classes of mappings is the class of monotone mappings due to its various applications. For solving many important problems, it is required to solve monotone inclusion problems, for instance, evolution equations, convex optimization problems, complementarity problems and variational inequalities problems.

The first algorithm for approximating the zero points of the monotone operator introduced by Martinet. In the past decades, many authors prepared various algorithms and investigated the existence and convergence of zero points for maximal monotone mappings in Hilbert spaces.

A generalization of finding zero points of nonlinear operator is to find zero points of the sum of an α-inverse strongly monotone operator and a maximal monotone operator. Passty introduced an iterative methods so called forward-backward method for finding zero points of the sum of two operators. There are various applications of the problem of finding zero points of the sum of two operators.

Recently, some authors introduced and studied some algorithms for finding zero points of the sum of a α-inverse strongly monotone operator and a maximal monotone operator under different conditions.

In this paper, motivated and inspired in above, a shrinking projection algorithm is introduced for finding zero points of the sum of an inverse strongly monotone operator and a maximal monotone operator. We prove the strong convergence theorem under mild restrictions imposed on the control sequences.

Material and methods

In this scheme, first we gather some definitions and lemmas of geometry of Banach spaces and monotone operators, which will be needed in the remaining sections. In the next section, a shrinking projection algorithm is proposed and a strong convergence theorem is established for finding a zero point of the sum of an inverse strongly monotone operator and a maximal monotone operator.

Results and discussion

The generated sequence by the presented algorithm converges strongly to a zero point of the sum of an α-inverse strongly monotone operator and a maximal monotone operator in Hilbert spaces.

Conclusion

In this paper, we present an iterative algorithm for approximating a zero point of the sum of an α -inverse strongly monotone operator and a maximal monotone operator in Hilbert spaces.

- Under some mild conditions, we show the convergence theorem of the mentioned algorithm. Subsequently, some corollaries and applications of those main result is provided.
- This observation may lead to the future works that are to analyze and discuss the rate of convergence of these suggested algorithms.
- We obtain some applications of main theorem for solving variational inequality problems and finding fixed points of strict pseudocontractions.

Keywords: Maximal monotone operator, Resolvent operator, Forward-backward projection algorithm.

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