RELAXED IMPLICIT EXTRAGRADIENT-LIKE METHODS FOR FINDING MINIMUM-NORM SOLUTIONS OF THE SPLIT FEASIBILITY PROBLEM

LU-CHUAN CENG*, MU-MING WONG**, ADRIAN PETRUSEL*** AND JEN-CHIH YAO****

*Department of Mathematics, Shanghai Normal University; and Scientific Computing Key Laboratory of Shanghai Universities, Shanghai 200234, China E-mail: zenglc@hotmail.com

**Department of Applied Mathematics, Chung Yuan Christian University, Chung Li, 32023, Taiwan E-mail: mmwong@cycu.edu.tw

***Department of Applied Mathematics, Babeș-Bolyai University, 400084 Cluj-Napoca, Romania E-mail: petrusel@math.ubbcluj.ro

****Center for Fundamental Science, Kaohsiung Medical University, Kaohsiung 807, Taiwan; and Department of Mathematics, King Abdulaziz University P.O. Box 80203, Jeddah 21589, Saudi Arabia E-mail: yaojc@kmu.edu.tw

Abstract. In this paper, we consider the split feasibility problem (SFP) in infinite-dimensional Hilbert spaces, and study the relaxed implicit extragradient-like methods for finding a common element of the solution set $\Gamma$ of the SFP and the set Fix($S$) of fixed points of a nonexpansive mapping $S$. Combining Mann’s implicit iterative method and Korpelevich’s extragradient method, we propose two implicit iterative algorithms for finding an element of Fix($S$) $\cap$ $\Gamma$. On one hand, for $S = I$, the identity mapping, we derive the strong convergence of one implicit iterative algorithm to the minimum-norm solution of the SFP under appropriate conditions. On the other hand, we also derive the weak convergence of another implicit iterative algorithm to an element of Fix($S$) $\cap$ $\Gamma$ under mild assumptions.

Key Words and Phrases: Relaxed implicit extragradient-like methods, split feasibility problems, fixed point problems, nonexpansive mappings, minimum-norm solutions, demiclosedness principle.


Acknowledgments. In this research, the first author was partially supported by the National Science Foundation of China (11071169), the Innovation Program of Shanghai Municipal Education Commission (09ZZ133) and the Ph.D. program Foundation of Ministry of Education of China (20123127110002). The second author was partially supported by the grant NSC 99-2221-E-110-038-MY3. For the third author

*This research was partially supported by the National Science Foundation of China (11071169), Innovation Program of Shanghai Municipal Education Commission (09ZZ133) and Leading Academic Discipline Project of Shanghai Normal University (DZL707).

**Corresponding author. This research was partially supported by a grant from NSC.

****This research was partially supported by the grant NSC 99-2221-E-037-007-MY3.

327
this work was supported by a grant of the Romanian National Authority for Scientific Research, CNCS-UEFISCDI, project number PN-II-ID-PCE-2011-3-0094.

References


Received: September 28, 2011; Accepted: February 2, 2012.