Journal of Mathematical Inequalities
Volume 16, Number 3 (2022), 1061–1074
doi:10.7153/jmi-2022-16-71

ITERATIVE ALGORITHMS FOR COMMON SOLUTIONS OF SPLIT MIXED EQUILIBRIUM PROBLEMS AND FIXED POINT PROBLEMS OF λ–HYBRID MULTIVALUED MAPPINGS

WENLONG SUN, YANQIU LIU*, YUANFENG JIN* AND CHOONKIL PARK*

Abstract. In this paper, we present an iterative algorithm for solving split mixed equilibrium problems, fixed point problems of an infinite family of nonexpansive mappings and fixed point problems of λ-hybrid multivalued mappings in real Hilbert spaces. We prove that the proposed iterative algorithm converges weakly to a common solution of the considered problems under some mild assumptions.

Mathematics subject classification (2020): Primary 47H06, 47H09, 49J05, 47J25.
Keywords and phrases: Fixed point problem, split mixed equilibrium problem, λ-hybrid multivalued mapping, nonexpansive mapping.

REFERENCES

[1] Q. H. ANSARI, A. REHAN, C. F. WEN, *Implicit and explicit algorithms for split common fixed point problems*, J. Nonlinear Convex Anal., **17** (2016), 1381–1397.
[2] H. H. BAUSCHKE, P. L. COMBETTES, *Convex Analysis and Monotone Operator Theory in Hilbert Spaces*, Springer, New York, 2011.
[3] E. BLUM, W. OETTLI, *From optimization and variational inequalities to equilibrium problems*, Math. Student, **63** (1994), 123–145.
[4] A. BNOUHACHEM, *Strong convergence algorithm for split equilibrium problems and hierarchical fixed point problems*, Sci. World J. **2014** (2014), Article ID 390956.
[5] O. A. BOIKANYO, *A strongly convergent algorithm for the split common fixed point problem*, Appl. Math. Comput., **265** (2015), 844–853.
[6] L. C. CENG, J. C. YAO, *A hybrid iterative scheme for mixed equilibrium problems and fixed point problems*, J. Comput. Appl. Math., **214** (2008), 186–201.
[7] Y. CENSOR, A. SEGAL, *The split common fixed point problem for directed operators*, J. Convex Anal., **16** (2009), 587–600.
[8] K. GOEBEL, W. A. KIRK, *Topics in Metric Fixed Point Theory*, Cambridge: Cambridge Univ. Press, Cambridge, 1990.
[9] D. V. HIEU, *New extragradient method for a class of equilibrium problems in Hilbert spaces*, Appl. Anal., **97** (2018), 811–824.
[10] K. R. KAZMI, S. H. RIZVI, *Iterative approximation of a common solution of a split equilibrium problem, a variational inequality problem and a fixed point problem*, J. Egypt. Math. Soc., **21** (2013), 44–51.
[11] A. MOUDAFI, *Second order differential proximal methods for equilibrium problems*, J. Inequal. Pure Appl. Math., **4** (2003), no. 1, Article No. 18.
[12] M. O. AIBINU AND J. K. KIM, *On the rate of convergence of viscosity implicit iterative algorithms*, Nonlinear Funct. Anal. and Appl., 25 (1) (2020), 135–152, doi.org/10.22771/nfaa.2020.25.01.10.
[13] J. W. PENG, Y. C. LIOU, J. C. YAO, *An iterative algorithm combining viscosity method with parallel method for a generalized equilibrium problem and strict pseudocontractions*, Fixed Point Theory Appl., **2009** (2009), Article ID 794178, doi:10.1155/2009/794178.

Paper JMI-16-71

[14] K. SHIMOJI, W. TAKAHASHI, *Strong convergence to common fixed points of infinite nonexpasnsive mappings and applications*, Taiwan. J. Math., **5** (2001), 387–404.
[15] J. K. KIM, T. M. TUYEN AND M. T. NGOC HA, *Two projection methods for output sets in Hilbert spaces*, Numerical Functional Analysis and Optimization, 42 (8) (2021), 973–988, doi.org/10.1080/01630563.2021.1933528.
[16] S. SUANTAI, P. CHOLAMJIAK, Y. CHO, W. CHOLAMJIAK, *On solving split equilibrium problems and fixed point problems of nonspreading multi-valued mappings in Hilbert spaces*, Fixed Point Theory Appl., **2016** (2016), Paper No. 35.
[17] S. SUANTAI, W. PHUENGRATTANA, *Existence and convergence theorems for λ -hybrid mappings in Hilbert spaces*, Dyn. Contin. Discrete Impuls. Syst. Ser. A, Math. Anal., **22** (2015), 177–188.
[18] H. K. XU, *Iterative algorithms for nonlinear operators*, J. London Math. Soc., **66** (2002), 240–256.
[19] Y. YAO, Y. CHO, Y. C. LIOU, *Algorithms of common solutions for variational inclusions, mixed equilibrium problems and fixed point problems*, Euro. J. Operat. Research, **212** (2011), no. 2, 242–250.
[20] Y. YAO, Y. C. LIOU, J. C. YAO, *Split common fixed point problem for two quasi-pseudocontractive operators and its algorithm construction*, Fixed Point Theory Appl., **2015** (2015), Paper No. 127.
[21] H. H. BAUSCHKE, J. M. BORWEIN, *On projection algorithms for solving convex feasibility problems*, SIAM Rev. 1996; 38: 367–426.
[22] T. RAM, A. K. KHANNA AND R. KOUR, *Setvalued mixed quasi-equilibrium problems with operator solutions*, Nonlinear Funct. Anal. and Appl., 27 (1) (2022), 83–97, doi.org/10.22771/nfaa.2022.27.01.05.
[23] O. K. OYEWOLE AND O. T. MEWOMO, *Existence results for new generalized mixed equilibrium and fixed point problems in Banach spaces*, Funct. Anal. and Appl., 25 (2) (2020), 273–301, doi.org/10.22771/nfaa.2020.25.02.06.