J. Adv. Math. Stud.
Vol. **15**(2022), No. 1, 01-10
http://journal.fairpartners.ro

INERTIAL METHODS FOR SOLVING SYSTEM OF QUASI VARIATIONAL INEQUALITIES

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Abstract. In this paper, we consider a system of quasi variational inequalities involving two arbitrary mappings. It is shown that the system of quasi variational inequalities are equivalent to the fixed point problem using the projection method. We use this alternative formulation to suggest some new inertial projection methods. The convergence criteria of the new methods is analyzed under some appropriate conditions. Several special cases are discussed as applications of the results. It is interesting problem to consider the implementation of the proposed methods with other similar techniques. The concept of this paper may inspire future research in this area. Results obtained in this paper can be viewed as refinement and improvement of previously known results.

REFERENCES

[1] F. Alvarez: *Weak convergence of a relaxed and inertial hybrid projection-proximal point algorithm for maximal monotone operators in Hilbert space*, SIAM J. Optim., **14**(2003), 773-782.
[2] A.S. Antipin: *Minimization of convex functions on convex sets by means of differential equations*, Differ. Equ., **30**(2003), No. 9, 1365-1357.
[3] F. Alvarez and H. Attouch: *An inertial proximal method for maximal monotone operators via discretization of a nonlinear oscillator with damping*, Set-Valued Var. Anal., **9**(2001), 3-11.
[4] H. Attouch and M.O. Czarnecki: *Asymtotic control and stabilization of nonlinear oscillators with non-isolated equilibria*, J. Differential Equations, **179**(2002), 278-31.
[5] H. Attouch, X. Goudon and P. Redont: *The heavy ball with friction. I. The continuous dynamical system*, Commun. Contemp. Math., **2**(2000), 1-34.
[6] A.S. Antipin, M. Jacimović and N. Mijajlović: *Extra gradient method for solving quasi variational inequalities*, Optimization, **67**(2018), No. 1, 103-112.
[7] A. Bensoussan and J.L. Lions: *Application des inéqualities variationnelles en côntrol eten stochastique*, Dunod, Paris, 1978.
[8] S. Jabeen, M.A. Noor and K.I. Noor: *Inertial iterative methods for general quasi variational inequalities and dynamical systems*, J. Math. Anal., **11**(2020), No. 3, 14-29.
[9] S. Jabeen, M.A. Noor and K.I. Noor: *Some new inertial projection methods for quasi variational inequalities*, Appl. Math. E-Notes, **21**(2021), 172-178.
[10] S. Jabeen, B.B. Bandar, M.A. Noor and K.I. Noor: *Inertial projection methods for solving general quasi-variational inequalities*, AIMS Mathematics, **6**(2021), No. 2, 1075-1086.
[11] N. Mijajlović, J. Milojica and M.A. Noor: *Gradient-type projection methods for quasi-variational inequalities*, Optim. Let., **13**(2019), 1885-1896.
[12] P.E. Mainge: *Regularized and inertial algorithms for common fixed points of nonlinear operators*, J. Math. Anal. Appl., **344**(2008), 876-887.

Received: May 08, 2021. *Revised*: October 19, 2021.
2010 *Mathematics Subject Classification*: 26D15, 49J40, 90C23.
Key words and phrases: Quasi variational inequalities, projection method, inertial methods, monotone operators, convergence analysis.

[13] M.A. Noor: *An iterative scheme for class of quasi variational inequalities*, J. Math. Anal. Appl., **110**(1985), 463-468.
[14] M.A. Noor: *Some developments in general variational inequalites*, Appl. Math. Comput., **152**(2004), 199-277.
[15] M.A. Noor, K.I. Noor and B.B. Mohsen: *Some new classes of general quasi variational inequalities*, AIMS Mathematics, **6**(2021), No. 6, 6406-6421.
[16] M.A. Noor, K.I. Noor and M.Th. Rassias:*New trends in general variational inequalities*, Acta Appl. Math., **170**(2020), No. 1, 981-1064.
[17] M.A. Noor, K.I. Noor and A.G. Khan: *Parallel schemes for solving a system of extended general quasi variational inequalities*, Appl. Math. Comput., **245**(2014), 566-574.
[18] M.A. Noor, K.I. Noor, A.G. Khan and R. Latif: *Some new algorithms for solving a system of general variational inequalities*, Appl. Math. Inf. Sci., **10**(2016), No. 2, 557-564.
[19] B.T. Polyak: *Some methods of speeding up the convergence of iterative methods*, Zh. Vychisl. Mat. Mat. Fiz., **4**(1964), 791-803.
[20] G. Stampacchia: *Formes bilineaires coercitives sur les ensembles convexes*, Comptes Rendus Acad. Sci. Math., **258**(1964), 4413-4416.
[21] Y. Shehu, A. Gibali and S. Sagratella: *Inertial projection-type method for solving quasi variational inequalities in real Hilbert space*, J. Optim. Theory Appl., **184**(2020), 877-894.
[22] H.K. Xu: *Iterative algorithms for nonlinear operators*, J. Lond. Math. Soc. (2), **66**(2002), 240-256.

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