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GENERALIZED COMPLEMENTARITY PROBLEM WITH ITS CORRESPONDING GENERALIZED VARIATIONAL INEQUALITY PROBLEM INVOLVING XOR-OPERATION

RAIS AHMAD, MOHD. ISHTYAK, ZAHOOR AHMAD RATHER, AND TAO ZHANG*

Abstract. In this paper, we study a generalized complementarity problem and its corresponding generalized variational inequality problem involving XOR - operation. It is shown that both the problems are equivalent if the underlying convex set is a cone. An iterative algorithm is established to approximate the solution of generalized variational inequality problem involving XOR-operation using projection operator. Finally, an existence and convergence result is proved and a numerical example is provided using Matlab program.

1. Introduction

Monotone variational inequality problems in the framework of infinite dimensional spaces recently were investigated; see, e.g., [8, 10, 25, 31] and the references therein. Variational inequalities as the logical extension of variational principles have been generalized by several authors in different directions based on various iterative methods; see, e.g., [11, 26, 28, 32] and the references therein. Variational inequalities can be considered as a mathematical tool for solving many problems related to mechanics, operation research, medical imaging, machine learning, structural analysis, oceanography, free and moving boundary problems and so on; see, e.g., [6, 7, 12, 14, 29] and the references therein. The concept of complementarity problem is equally important and it is a related area of operation research. Linear complementarity problems are important problems of optimization in that the optimality criterion for linear programming and the necessary optimality conditions for quadratic programming can be conveyed through linear complementarity problems. Lemke and Howson [21] have shown that the problem of determining the Nash equilibrium point of a bimatrix game can be constituted as a linear complementarity problem.

In 1964, Cottle [13] in his Ph.D thesis introduced and studied nonlinear complementarity problem, which is a parallel problem of a variational inequality problem. The initial aim of introducing nonlinear complementarity problem was to compute stationary points for nonlinear programming. Applications of complementarity problems arise naturally in economics, engineering and sciences. It has been shown by Karamardian [20] that if the convex set involved in the variational inequality problem and the complementarity problem is a cone, then both the problems are equivalent. For more details on complementarity problems and their variants, such

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