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ERROR ANALYSIS FOR A CLASS OF NONLINEAR QUASI VARIATIONAL INEQUALITIES

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Abstract. In this paper, solvability and existence of unique solution of generalized strongly nonlinear quasivariational inequality are proved based on the notion of $F-$ monotonicity. The associated complementarity problem is formulated. Equivalence between generalized strongly nonlinear quasicomplementarity problem (in short GSNQCP) and generalized strongly nonlinear quasivariational inequality problem (GSNQVIP) with respect to F–monotone mapping is established under certain conditions. An iterative algorithm is proposed to approximate the exact solution of the GSNQVIP with respect to F–monotone mapping and its strong convergence is established. The error bounds for the approximate solution of GSNQVIP are obtained with the help of the residue vector.

Keywords. quasivariational inequality, F–monotonicity, quasicomplementarity problem, iterative algorithm, residue vector.

AMS (MOS) subject classification: 47H05, 58E35, 90C33.

1 Introduction

Throughout this paper we suppose that S is a closed, convex subset of real Hilbert space X. Let F, T and A be nonlinear operators from S to X and $K : S \rightrightarrows X$. In this paper we study the following generalized strongly nonlinear quasivariational inequality problem (in short GSNQVIP) with respect to F-monotone mapping which consists in finding x in the constraint set $K(x)$, such that,

$$\langle Tx, z - F(y-x) - x\rangle \geq \langle Ax, z - F(y-x) - x\rangle, \forall y \in S, \forall z \in K(x), \quad (1)$$

where $K(x) = m(x) + S$ and m is a point–to–point mapping on S. Any $x \in K(x)$ which satisfies the above equation is called a solution of GSNQVI (1). Similarly,

$$x \in K(x) : \langle Ty, z - F(y-x) - x\rangle \geq \langle Ay, z - F(y-x) - x\rangle, \forall y \in S, \forall z \in K(x) \quad (2)$$