



Available at
www.ElsevierMathematics.com

POWERED BY SCIENCE @ DIRECT®

Applied Mathematics Letters 17 (2004) 345–352

**Applied
Mathematics
Letters**

www.elsevier.com/locate/aml

Sensitivity Analysis for a New System of Generalized Nonlinear Mixed Quasi-Variational Inclusions

R. P. AGARWAL

Department of Mathematical Sciences, Florida Institute of Technology
Melbourne, FL 32901-6975, U.S.A.
agarwal@fit.edu

NAN-JING HUANG AND MAN-YI TAN

Department of Mathematics, Sichuan University
Chengdu, Sichuan 610064, P.R. China

(Received October 2002; accepted November 2002)

Abstract—In this paper, we introduce a new system of generalized nonlinear mixed quasi-variational inclusions, prove the existence of solution, and give the sensitivity analysis of solution for the system of generalized nonlinear mixed quasi-variational inclusions in Hilbert spaces. © 2004 Elsevier Ltd. All rights reserved.

Keywords—System of mixed quasi-variational inclusions, Nonlinear mapping, Solution, Sensitivity analysis, Hilbert space.

1. INTRODUCTION

It is well known that variational inequality theory and complementarity problem theory are very powerful tools of the current mathematical technology. In recent years, classical variational inequality and complementarity problems have been extended and generalized to study a large variety of problems arising in mechanics, physics, optimization and control, nonlinear programming, economics and transportation equilibrium, and engineering sciences, etc. (See [1–12] and the references therein.)

Sensitivity analysis of solution for variational inequalities have been studied by many authors. By using the projection technique, Dafermos [13], Mukherjee and Verma [14], Noor [15], and Yen [16] dealt with the sensitivity analysis of solution for variational inequalities and quasi-variational inequalities. By using the implicit function approach that makes use of so-called normal mappings, Robinson [17] studied the sensitivity analysis of solutions for variational inequalities. Recently, Agarwal, Cho and Huang [1] and Noor and Noor [18] dealt with the sensitivity analysis of solutions for the quasi-variational inclusions by using the implicit resolvent equations technique without assuming the differentiability of the given data.

This work was supported by the National Natural Science Foundation of China (10171070) and the Scientific Research Foundation for the Returned Overseas Chinese Scholars, State Education Ministry.

The purpose of this paper is to introduce a new system of generalized nonlinear mixed quasi-variational inclusions, prove the existence of solution, and give the sensitivity analysis of solution for the system of generalized nonlinear mixed quasi-variational inclusions in Hilbert spaces.

2. PRELIMINARIES

Throughout this paper, let H be a real Hilbert space endowed with the inner product $\langle \cdot, \cdot \rangle$ and norm $\| \cdot \|$, respectively. Let $M, N : H \rightarrow 2^H$ be two maximal monotone mappings and $A, S, B, T : H \rightarrow H$ be nonlinear single-valued mappings. We consider the problem of finding $(x, y) \in H \times H$ such that

$$\begin{aligned} 0 &\in x - y + \rho(A(y) + S(y)) + \rho M(x), \\ 0 &\in y - x + \gamma(B(x) + T(x)) + \gamma N(y), \end{aligned} \quad (2.1)$$

which is called the system of generalized nonlinear mixed quasi-variational inclusions, where $\rho > 0$ and $\gamma > 0$ are two constants.

Special cases of problem (2.1) are as follows.

1. If $M = \partial\varphi_1$, $N = \partial\varphi_2$, where $\varphi_1, \varphi_2 : H \rightarrow R \cup \{+\infty\}$ are two proper convex lower semicontinuous functions, then problem (2.1) reduces to finding $(x^*, y^*) \in H \times H$ such that

$$\begin{aligned} \langle \rho(Ay^* + Sy^*) + x^* - y^*, x - x^* \rangle &\geq \rho\varphi_1(x^*) - \rho\varphi_1(x), & \forall x \in H, \\ \langle \gamma(Bx^* + Tx^*) + y^* - x^*, x - y^* \rangle &\geq \gamma\varphi_2(y^*) - \gamma\varphi_2(x), & \forall x \in H, \end{aligned} \quad (2.2)$$

which is called the system of generalized nonlinear mixed variational inequalities.

2. If $M = N = \partial\varphi$, where $\varphi : H \rightarrow R \cup \{+\infty\}$ is a proper convex lower semicontinuous function, then problem (2.1) reduces to finding $(x^*, y^*) \in H \times H$ such that

$$\begin{aligned} \langle \rho(Ay^* + Sy^*) + x^* - y^*, x - x^* \rangle &\geq \rho\varphi(x^*) - \rho\varphi(x), & \forall x \in H, \\ \langle \gamma(Bx^* + Tx^*) + y^* - x^*, x - y^* \rangle &\geq \gamma\varphi(y^*) - \gamma\varphi(x), & \forall x \in H, \end{aligned} \quad (2.3)$$

which is called the system of nonlinear mixed variational inequalities.

3. If $A = B = 0$, then problem (2.2) reduces to finding $(x^*, y^*) \in H \times H$ such that

$$\begin{aligned} \langle \rho Sy^* + x^* - y^*, x - x^* \rangle &\geq \rho\varphi(x^*) - \rho\varphi(x), & \forall x \in H, \\ \langle \gamma Tx^* + y^* - x^*, x - y^* \rangle &\geq \gamma\varphi(y^*) - \gamma\varphi(x), & \forall x \in H, \end{aligned} \quad (2.4)$$

which is called the system of nonlinear mixed variational inequalities.

4. If $\varphi = \delta_K$ (the indicator function of a nonempty closed convex subset K), then problem (2.2) reduces to finding $(x^*, y^*) \in K \times K$ such that

$$\begin{aligned} \langle \rho Ay^* + Sy^* + x^* - y^*, x - x^* \rangle &\geq 0, & \forall x \in K, \\ \langle \gamma Bx^* + Tx^* + y^* - x^*, x - y^* \rangle &\geq 0, & \forall x \in K, \end{aligned} \quad (2.5)$$

which is called the system of general nonlinear variational inequalities.

5. If $\varphi = \delta_K$ and $A = B = 0$, then problem (2.3) reduces to finding $(x^*, y^*) \in K \times K$ such that

$$\begin{aligned} \langle \rho Sy^* + x^* - y^*, x - x^* \rangle &\geq 0, & \forall x \in K, \\ \langle \gamma Tx^* + y^* - x^*, x - y^* \rangle &\geq 0, & \forall x \in K, \end{aligned} \quad (2.6)$$

which is called the system of nonlinear variational inequalities considered by Verma [11].

متن کامل مقاله

دریافت فوری ←

ISIArticles

مرجع مقالات تخصصی ایران

- ✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
- ✓ امکان دانلود نسخه ترجمه شده مقالات
- ✓ پذیرش سفارش ترجمه تخصصی
- ✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
- ✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
- ✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
- ✓ دانلود فوری مقاله پس از پرداخت آنلاین
- ✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات