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EXISTENCE OF GLOBAL SOLUTIONS FOR SECOND ORDER IMPULSIVE ABSTRACT FUNCTIONAL INTEGRODIFFERENTIAL EQUATIONS

V. Vijayakumar[1], S. Sivasankaran[2] and M. Mallika Arjunan[3]

[1]Department of Mathematics, Info Institute of Engineering, Kovilpalayam, Coimbatore - 641 107, Tamil Nadu, India. email: vijaysarovel@gmail.com

[2]Department of Mathematics, University College, Sungkyunkwan University, Suwon 440-746, South Korea, email: sdsiva@gmail.com

[3]Department of Mathematics, Karunya University, Karunya Nagar, Coimbatore- 641 114, Tamil Nadu, India, email: arjunphd07@yahoo.co.in

Abstract. In this paper, we study the existence of global solutions for a class of second order impulsive abstract functional integrodifferential equations. The results are obtained by using Leray-Schauder's Alternative fixed point theorem. An application is provided to illustrate the theory.

Keywords. Second order abstract Cauchy problem; Cosine function of operators; Impulsive systems; Integrodifferential equations; Global solutions.

AMS (MOS) subject classification: 34A37, 34K30, 35R10, 35R12.

1 Introduction

In this paper, we discuss the existence of global solutions for a class of second order impulsive abstract functional integrodifferential equation of the form

$$\begin{cases} u''(t) = Au(t) + f\Big(t, u(t), \int_0^t h(t,s,u(s))ds\Big), \quad t \in I, \\ u(0) = u_0, \quad u'(0) = \zeta \in X, \\ \Delta u(t_i) = I_i(u(t_i)), \\ \Delta u'(t_i) = J_i(u(t_i)), \quad i \in \mathbb{F} \subset \mathbb{N}, \end{cases} \tag{1.1}$$

where A is the infinitesimal generator of a strongly continuous cosine function of bounded linear operator $(C(t))_{t\in\mathbb{R}}$ defined on a Banach space X; $I = [0,a]$ or $I = [0,\infty)$; the points t_i, $i \in \mathbb{F} \subset \mathbb{N}$, are fixed numbers in the interior of I; $f : I \times X^2 \to X$, $h : I \times I \times X \to X$, $I_i : X \to X$, $J_i : X \to X$, $i \in \mathbb{F}$, are appropriate functions and the symbol $\Delta\xi(t)$ represents the jump of the function ξ at t, which is defined by $\Delta\xi(t) = \xi(t^+) - \xi(t^-)$.

Since impulsive differential systems have been highly recognized and applied in a wide spectrum of fields such as mathematical modeling of physical