CONTROLLABILITY OF SECOND ORDER NEUTRAL IMPULSIVE DIFFERENTIAL INCLUSIONS WITH NONLOCAL CONDITIONS

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Abstract. In this short article, we have studied the controllability result for second order neutral impulsive differential inclusions with nonlocal conditions using the fixed point theorem for condensing multi-valued maps due to Martelli [22]. The result is proved without compactness of the family of Cosine operators in infinite dimension space. The system considered here follows the P.D.E involving spatial partial derivatives with α- norms.

Keywords. Controllability, Spatial partial derivative, Fixed point theorems.

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1 Introduction

In this paper we have discussed the controllability of nonlocal Cauchy problem for second order neutral impulsive differential inclusions in a Banach space X of the form

$$\begin{cases} \frac{d}{dt}\left[x^{'}(t) - F(t, x(h_1(t)))\right] \in Ax(t) + Bu(t) + G(t, x(h_2(t)), x^{'}(h_2(t))); \\ \Delta x|_{t=t_k} = I_k(x(t_k^-)); \ k = 1, 2, ...m; \\ \Delta x^{'}|_{t=t_k} = \overline{I_k}(x(t_k^-)); \ k = 1, 2, ...m; \\ x(0) + g(x) = x_0; \ \ x'(0) = y_0; \qquad t \in J := [0, b]; \ t \neq t_k, \end{cases} \quad (1.1)$$

where A is the infinitesimal generator of the strongly continuous Cosine family $\{C(t) : t \in R\}$ defined on X; $G : J \times X \times X \to X$ is a multi-valued map and $\Delta x|_{t=t_k} = x(t_k^+) - x(t_k^-)$, $\Delta x^{'}|_{t=t_k} = x'(t_k^+) - x'(t_k^-)$, and $x(t_k^-)$ and