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EXISTENCE OF MILD SOLUTIONS FOR SECOND ORDER NONLOCAL IMPULSIVE NEUTRAL EVOLUTION EQUATIONS WITH STATE-DEPENDENT INFINITE DELAY

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Abstract. In this paper, we study the existence of mild solutions for the impulsive second order abstract partial neutral functional differential equations with state dependent infinite delay. We have used here the new definition of phase space for infinite delay argument. We rely on the Leray Schauder alternative and Sadovskii's fixed point theorem to prove the existence results. We prove the results using the noncompactness of the family of cosine operators. An example is provided to illustrate the theory.

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1 Introduction

In this paper, we study the existence of mild solutions for the impulsive second order abstract partial neutral differential equations with state dependent delay of the form

$$\frac{d}{dt}[x'(t)+g(t,x_{\rho(t,x_t)})))] = Ax(t)+f(t,x_{\rho(t,x_t)}),\quad t\in[0,a],\quad t\neq t_i; \tag{1}$$

$$x(0) = x_0+p(x)\in\mathcal{B}_h; \tag{2}$$

$$x'(0) = y_0+q(x)\in X; \tag{3}$$

$$\Delta x(t_i) = I_i^1(x_{t_i}),\quad t=t_i\quad i=1,2,\ldots,n; \tag{4}$$

$$\Delta x'(t_i) = I_i^2(x_{t_i}),\quad t=t_i\quad i=1,2,\ldots,n; \tag{5}$$

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