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EXISTENCE OF SOLUTIONS AND PERIODIC SOLUTIONS FOR ABSTRACT NEUTRAL EQUATIONS WITH UNBOUNDED DELAY [1]

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Abstract. In this paper, by using Sadovskii fixed point theorem, we study the existence of solutions and periodic solutions for a class of abstract neutral impulsive functional evolution equations with unbounded delay. An example is presented in the end to show the applications of the obtained results.

Keywords. Linear evolution operator, functional evolution equations, unbounded delay, measure of non-compactness, fixed point theorem.

AMS (MOS) subject classification: 34K30, 34K40, 34K45.

1 Introduction

In this paper, we will investigate the existence of solutions and periodic solutions for the following abstract neutral impulsive functional evolution equation with unbounded delay:

$$\begin{cases} \frac{d}{dt}[x(t)+F(t,x_t)]+A(t)x(t)=G(t,x_t), \ \ 0\leq t\leq a, \ \ t\neq t_k, \\ \Delta x|_{t=t_k}=I_k(x(t_k{}^-)), \ \ k=1,2,\ldots,m, \\ x_0=\phi\in\mathcal{B}. \end{cases} \tag{1.1}$$

where $x(.)$ takes values in a Banach space X, the family $\{A(t):0\leq t\leq a\}$ of unbounded linear operators generates a linear evolution operator, and $F,G:[0,a]\to\mathcal{B}$ are appropriate functions, $\mathcal{B}$ is the phase space to be specified later.

There has been an increasing interest in the study of semilinear evolution equations of form

$$\begin{cases} \frac{d}{dt}[x(t)+F(t,x_t)]+A(t)x(t)=G(t,x_t), \ \ 0\leq t\leq a, \\ x_0=\phi\in\mathcal{B}. \end{cases} \tag{1.2}$$

such as existence and asymptotic behavior of solutions (mild solutions, strong solutions and classical solutions), and existence of (almost) periodic solutions,

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