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GLOBAL EXISTENCE IN INTEGRABLE SPACE FOR IMPULSIVE FDE WITH P-DELAY[1]

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Abstract. Instead of the space C with a superior norm,we introduce a space C_1 with a L_1 norm and investigate the existence, uniqueness and global existence of solutions for the impulsive functional differential equation with p-delay:

$$\begin{cases} \frac{dx}{dt} = f(t, \tilde{x}_t), & t \geq t_o, \\ x(t_k) - x(t_k^-) = I_k(x(t_k^-)), & k \in N; \end{cases}$$

where $\tilde{x}_t(\theta) = x(p(t, \theta))$ (p belongs to some class of functions), $-r \leq \theta \leq 0$, $I_k(x) \in C(R^n, R^n)$, $\lim_{k\to\infty} t_k = +\infty$ and satisfies

$$t_o < t_1 < t_2 < \cdots < t_n < \cdots.$$

We have got a criterion for the global existence for solutions of the given equation which guarantees the possibility for the investigation of other behaviors of solutions such as stability and oscillation.

Keywords. Functional Differential Equation, Impulses, $p-$Delay, Uniqueness, Global Existence

AMS (MOS) subject classification: 34K20, 34A19, 34D20

1 Introduction

In the recent ten years, there have appeared many papers about impulsive ordinary differential equations (IODE)([1,3-5,9]), and some authors have begun to concern the theory of functional differential equations with impulses (for example, see [2,7- 8]). The motivation comes from the potential application of differential equations with instant perturbations. As we know, the investigation of many properties of solutions for a given equation, such as stability, oscillation, needs its guarantee of global existence. Thus it is important and necessary to establish sufficient conditions for global existence of solutions for impulsive functional differential equations (IFDE).

In this paper, we shall establish sufficient conditions for the global existence for IFDE with a general form:

$$\begin{cases} \frac{dx}{dt} = f(t, \tilde{x}_t), & t \geq t_o, \\ x(t_k) - x(t_k^-) = I_k(x(t_k^-)), & k \in N, \\ \tilde{x}_{t_o}(\theta) = \varphi(\theta), & -r \leq \theta \leq 0, \end{cases} \tag{1.1}$$

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