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Existence of Solutions to a New Class of Abstract Non-Instantaneous Impulsive Fractional Integro-Differential Equations

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Abstract: In this paper we prove the sufficient conditions for the existence and uniqueness of piecewise continuous mild solutions to fractional integro-differential equations in a Banach space with non instantaneous impulses. The results are established by using the theory of sectorial operators and the fixed point theorem. We discuss an example to illustrate the analytical results obtained.

Keywords: *sectorial operator; solution operator; non-instantaneous impulses; Krasnoselskii's fixed point theorem.*

Mathematics Subject Classification (2010): 34G20, 34K30, 34K40, 47N20.

1 Introduction

Let $(X, \|\cdot\|)$ be a complex Banach space. The objective of this paper is to study the solutions to a new class of abstract integro-differential equations of fractional order with non-instantaneous impulses in X :

$$\left.\begin{aligned} {}^cD_t^\alpha[u(t)+\varphi(t,u(t))] &= Au(t)+J_t^{1-\alpha}f(t,u(t)), \\ &\qquad t\in(s_i,t_{i+1}],\ i=0,1,\cdots,N,\ 0<\alpha<1, \\ u(t) &= g_i(t,u(t)),\quad t\in(t_i,s_i],\quad i=1,2,\cdots,N, \\ u(0) &= u_0, \end{aligned}\right\} \tag{1}$$

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