EXISTENCE AND CONTROLLABILITY RESULTS OF IMPULSIVE NEUTRAL FRACTIONAL INTEGRO-DIFFERENTIAL EQUATION WITH SECTORIAL OPERATOR AND INFINITE DELAY

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Abstract. In this paper, we deal with the existence, uniqueness and controllability results for fractional impulsive neutral functional integro-differential evolution equation in Banach spaces. The main techniques depend on the fractional calculus properties of characteristic solution operators and sectorial operators. Particulary, we do not consider that the system produces a compact semigroup. So we claim that phase space for infinite delay with impulse. Finally an example is given to illustrate for our required results.

Keywords. Fractional derivative, Impulsive neutral functional differential equation, Schaefer's Fixed point theorem, Sectorial operators, controllability.

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1   Introduction

The theory of fractional differential and integral equations have been proved to be valuable tools and effective in the modeling of many phenomena in various fields of engineering and scientific disciplines such as physics, chemistry, biology, control theory, signal processing, biophysics, blood flow phenomena, aerodynamics and so on. For more info on fractional calculus theory and applications, one can see the monographs of Kilbas et al [1], Lakshmikantham et al [2], Miller and Ross [3], Podlubny [4], Baleanu et al [5–7] and the papers [8–12] as well as the references therein.

The fractional derivatives are helpful tools for sort of remembrance and hierarchy properties of numerous equipment and processes, which cannot be characterized by integer-order derivatives. The fractional differential equations have gained significant value during the past three decades. Hence, the theory of fractional differential equations has emerged as an effective branch of applied mathematics. It has been old to concept a lot of mathematical