



On Approximate Controllability of Impulsive Fractional Semilinear Systems with Deviated Argument in Hilbert Spaces

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Abstract: In this paper we apply a fixed-point theorem to study the existence and uniqueness of a mild solution and the approximate controllability of a fractional order impulsive differential equation with deviated argument in Hilbert spaces. An example is provided to show the effectiveness of the theory.

Keywords: *controllability; differential equations with impulses; deviated arguments; fractional derivatives and integrals; semigroup theory; fixed-point theorems.*

Mathematics Subject Classification (2010): 93B05, 34A37, 34K30, 26A33, 47H10.

1 Introduction

Differential equations with deviated arguments have received considerable attention in recent years due to their ability to generalize differential equations that show an unknown quantity and their derivatives in different values of their arguments. It is an ideal model for the study of automatic control theory, self-oscillating systems theory, long-term planning problems in economics, etc. For more details about differential equations with deviated arguments, we refer to the papers [8, 11, 15] and the references therein.

Interestingly, in this paper, we will enhance the study of differential equations with deviated arguments by fractional calculus, which, in turn, is currently attracting considerable interest from researchers, due to its wide range of applications in various scientific and technological fields such as thermal engineering, electromagnetism, control, robotics,

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