



Approximate Controllability of Nonlocal Impulsive Fractional Order Semilinear Time Varying Delay Systems

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Abstract: This paper concerns with approximate (exact) controllability of nonlocal impulsive fractional order semilinear control system with time varying delay. Simple sufficient conditions for the controllability are derived by assuming that the corresponding linear control system is controllable. The results are established under the Lipschitz continuity of nonlinear function. In particular, compactness of the semi-group and uniform boundedness of nonlinear function both are dropped. Finally, some examples are given to illustrate the developed theory.

Keywords: *fractional order semilinear systems; time varying delay; reachable set; approximate controllability.*

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1 Introduction

During the last three decades, various problems on fractional order systems have been investigated. Fractional order semilinear equations arise in the modeling of the problems in engineering, physics, medicine, finance, control and many other fields. Particularly, fractional order equations frequently appear in diffusion process, electrical science, electrochemistry, control science and several more. For more details see [1–6] and the references cited therein.

Controllability is the qualitative property of dynamical systems and is of particular importance in mathematical control theory. In literature various controllability problems for different types of semilinear dynamical systems have been studied [7–19] using several

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