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ON CONTROLLABILITY OF NONLINEAR IMPULSIVE INTEGRODIFFERENTIAL SYSTEMS

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Abstract. Many practical systems in physics, chemistry, biology and engineering have impulsive dynamical behaviors due to sudden changes at certain instants during the evolution process. These complex dynamical behaviors can be modeled by impulsive differential equations. This paper studies the exact controllability issue for nonlinear impulsive integrodifferential systems with finite delay in Hilbert spaces. Without imposing compactness condition on the semigroup operator, we establish controllability results by using a fixed point analysis approach. Finally, two examples are provided to show the usefulness of the proposed theory. The results extend and improve some recent results.

Keywords. Controllability, fixed point theorem, mild solutions, nonlinear impulsive systems.

AMS (MOS) subject classification: 34K30, 34F05, 60H10

1 Introduction

It is well known that controllability of deterministic equation are widely used in many branches of science and engineering. Many systems in physics and biology exhibit impulsive dynamical behavior due to sudden jumps at certain instants during the dynamical process. It is well known, for example, that many biological phenomena involving thresholds, bursting rhythm models in medicine and biology, model of population growth systems do exhibit impulsive effects (see [3],[9],[15],[20],[21]). The theory of impulsive integrodifferential equations and its applications to the field of physics have been very active research topic since the theory provides a natural framework for mathematical modeling of many physical phenomena. Moreover, impulsive control, which is based on the theory of impulsive integrodifferential equations has gained renewed interests recently for its promising applications towards controlling systems exhibiting chaotic behavior. Motivated by these facts, our main purpose in this paper is to study controllability of nonlinear impulsive integrodifferential systems.