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SOME REMARKS ON THE DYNAMICS OF IMPULSIVE SYSTEMS IN BANACH SPACES

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Abstract. In this paper we propose a general class of impulsive systems in infinite dimensional Banach space which includes the classical model widely studied in the literature. We study the questions of existence and regularity properties of solutions for these models. We also study continuous dependence of solutions on various parameters, specially the driving measures. The paper is concluded with comments on some open problems.
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1. Introduction

Let $I \equiv (0,T)$ be a bounded interval of the real line and define the set $D \equiv \{t_1, t_2, \cdot, \cdot, t_n\} \in (0,T)$. A semilinear impulsive system is popularly described by the following set of evolution equations

$$\dot{x}(t) = Ax(t) + f(x(t)), t \in I \setminus D, x(0) = x_0, \quad (1)$$

$$\triangle x(t_i) = G_i(x(t_i)), t_i \in D, \quad (2)$$

where, generally, A is the infinitesimal generator of a C_0-semigroup, $S(t), t \geq 0$, in a Banach space E, the functions $f, G_i, i = 0, 1, 2, \cdot, \cdot n$ are continuous nonlinear maps from E to E, and $\triangle x(t_i) \equiv x(t_i+) - x(t_i-)$. This represents the jump in the state x at time t_i with G_i determining the size of the jump at time t_i.

Interesting examples of impulsive systems are found in population dynamics, reaction diffusion equations subject to abrupt changes caused by epidemic, harvesting or immigration [13]. In the study of vibration of engineering structures such as beams, satellites with flexible appendages, suspension bridges etc, presence of any form of impact forces leads to an impulsive evolution equation.

For basic theory of impulsive differential equations the reader is referred to [7]. In recent years Impulsive evolution equations on infinite dimensional Banach spaces have been considered in several papers by Liu, Rogovchenko, Guo and Liu [6,8,9] and Ahmed [2,3,4]. In the papers [2,3,4] the author