56 (2011) APPLICATIONS OF MATHEMATICS No. 2, 227–250

IMPULSIVE SEMILINEAR NEUTRAL FUNCTIONAL DIFFERENTIAL INCLUSIONS WITH MULTIVALUED JUMPS

Nadjet Abada, Constantine, Ravi P. Agarwal, Melbourne,
Mouffak Benchohra, Sidi Bel Abbès, Hadda Hammouche, Ouargla

(Received August 11, 2008)

Abstract. In this paper we establish sufficient conditions for the existence of mild solutions and extremal mild solutions for some densely defined impulsive semilinear neutral functional differential inclusions in separable Banach spaces. We rely on a fixed point theorem for the sum of completely continuous and contraction operators.

Keywords: impulsive semilinear neutral functional differential equation, densely defined operator, infinite delay, phase space, fixed point, mild solutions, extremal mild solution

MSC 2010: 34A37, 34G25, 34K30, 34K35, 34K45

1. Introduction

In this paper we are concerned with the existence of mild solutions and extremal mild solutions defined on a compact real interval for first order impulsive semilinear neutral functional inclusions in a separable Banach space. More precisely, we will consider the following first order impulsive semilinear neutral functional differential inclusions:

$$\frac{\mathrm{d}}{\mathrm{d}t}[y(t) - g(t, y_t)] - A[y(t) - g(t, y_t)] \in F(t, y_t), \quad \text{a.e. } t \in J = [0, b],\ t \neq t_k,\ k = 1, \ldots, m, \tag{1}$$

$$\Delta y|_{t=t_k} \in I_k(y(t_k^-)), \qquad k = 1, \ldots, m, \tag{2}$$

$$y(t) = \varphi(t), \quad t \in (-\infty, 0], \tag{3}$$

where $F\colon J \times D \to \mathcal{P}(E)$ is a compact and convex valued multivalued map, $g\colon J \times D \to E$ is a given function, $0 = t_0 < t_1 < \ldots < t_m < t_{m+1} = b$, $\varphi \in D$, where