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EXISTENCE OF SOLUTIONS FOR NONLINEAR IMPULSIVE VOLTERRA INTEGRAL EQUATIONS IN BANACH SPACES

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Abstract In this paper, we study the existence of solutions for nonlinear impulsive Volterra integral equations with infinite moments of impulse effect on the half line R^+ in Banach spaces. Some existence theorems of extremal solutions are obtained, which extend the related results for this class of equations with finite moments of impulse effect on finite interval in [1]. Our results are demonstrated by means of an example of an infinite system for impulsive integral equations.

AMS(MOS) Subject classifications: 45N05,47H07.

1. Introduction

In paper [1], D.Guo established some existence theorems of extremal solutions for nonlinear impulsive Volterra integral equations with finite moments of impulse effect on finite interval in Banach spaces, and offered some applications to initial value problems for first order impulsive differential equations in Banach spaces. In this paper, using Tonelii's method, we obtain some existence theorems of extremal solutions for nonlinear impulsive Volterra integral equations with infinite moments of impulse effect on the half line R^+ in Banach spaces, which generalize and improve the corresponding results of D.Guo [1]. Finally, an example is worked out.

Let P be a cone in a real Banach space E, and so P defines a partial ordering in E: $x \leq y$ iff $y - x \in P$. P is said to be solid if its interior $int(P)$ is not empty. We write $x \ll y$ iff $y - x \in int(P)$ (see[2]). Let $R^+ = \{t \in R^1 : t \geq 0\}$, $0 < t_1 < t_2 < \cdots < t_n < \cdots$ such that $t_n \to \infty (n \to \infty)$, and $PC[R^+, E] = \{x : x$ is a map from R^+ into E such that $x(t)$ is continuous at $t \neq t_k$, left continuous at $t = t_k$ and $\lim\limits_{t \to t_k^+} x(t)$ exist for $k = 1, 2, \ldots, n, \ldots\}$. We take $0 < T_1 < T_2 < \cdots < T_n < \cdots$ such that $T_n \to \infty (n \to \infty)$ and $T_i \neq t_j$ for any i, j. For any fixed T_k,

let $\|x\|_{T_k} = \sup\{\|x(t)\| : 0 \leq t \leq T_k\}$for each $x \in PC[R^+, E]$. Evidently, $\| \cdot \|_{T_k}$ is a seminorm on $PC[R^+, E]$, and the locally convex topology generated by the family of seminorms $\{\| \cdot \|_{T_k} : k = 1, 2, \ldots\}$ is that of uniform convergence on any compact subset of R^+.

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