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NONLINEAR IMPLICIT IMPULSIVE VOLTERRA TYPE RANDOM INTEGRAL EQUATIONS IN BANACH SPACES

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Abstract. In this paper, by using Banach fixed point theorem, we obtain existence, uniqueness and iterative approximation of solution for first-order nonlinear implicit impulsive Volterra type random integral equations in Banach spaces. The results presented in this paper improve and generalize some known corresponding results in the literature.
Keywords. Nonlinear implicit impulsive Volterra type random integral equation, Banach fixed point theorem, random solution, existence and uniqueness.
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1 Introduction

In this paper, we shall consider the following first-order nonlinear implicit impulsive Volterra type random integral equations:

Find $x : \Omega \times J \to E$ such that

$$\begin{aligned} x(\omega,t) = x_0(\omega) &+ \int_{t_0}^{t} (t-s) f(\omega, s, x(\omega,s), x'(\omega,s), T(\omega, x(\omega,s)))ds \\ &+ \sum_{t_0<t_k<t} (t-t_k) I_k(\omega, x(\omega,t_k)), \end{aligned} \tag{1.1}$$

where Ω is a measure space, E is Banach space, $J = [x_0, x_0 + a](a > 0)$, $x_0 : \Omega \to E$, $f : \Omega \times J \times E \times E \times E \to E$, $I_k : \Omega \times E \to E$ $(k = 1, 2, \cdots, m)$, $T(\omega, x(\omega,t)) = \int_{t_0}^{t} \kappa(\omega,t,s)x(\omega,s)ds$, $\kappa : \Omega \times D \to R^+ = [0,\infty)$ and $D = \{(t,s) |\, s,t \in J,\, t \geq s\}$.

By a solution of the equation (1.1) we mean a function $x \in PC^1(J,E)$ that satisfies (1.1).

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