Random Integral Equations


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A RANDOM VERSION OF SCHAEFER'S FIXED POINT THEOREM WITH APPLICATIONS TO FUNCTIONAL RANDOM INTEGRAL EQUATIONS

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Abstract. In this paper a random version of a fixed-point theorem of Schaefer is obtained and it is further applied to a certain nonlinear functional random integral equation for proving the existence result under Caratheodory conditions.

1. Introduction

Let $(\Omega, \mathcal{A})$ be a measurable space and let X be a Banach space with a Borel σ-algebra β_X. A mapping $x : \Omega \times X \to X$ is called random variable if for a $B \in \beta_{X'}$, $x^{-1}(B) \in \mathcal{A}$. A mapping $T : \Omega \times X \to X$ is called random operator if $T(., x)$ is measurable for each $x \in X$, and is generally expressed as $T(\omega, x) := T(\omega)x$. A random variable $\xi : \Omega \to X$ is called random fixed point of the random operator $T(\omega) : \Omega \times X \to X$ if $T(\omega)\xi(\omega) = \xi(\omega)$ for each $\omega \in \Omega$. A random operator $T : \Omega \times X \to X$ is called continuous if $T(\omega)(.)$ is continuous for each $\omega \in \Omega$, $T(\omega)$ is called totally bounded if for any bounded set B in X, $T(\omega)(B)$ is a totally bounded subset of X for each $\omega \in \Omega$. Similarly a random operator $T(\omega)$ is called completely continuous on X if it is continuous and totally bounded random operator on X. Again the random operator $T : \Omega \times X \to X$ is called compact if $\overline{T(\omega)(X)}$ is a compact subset of X for each $\omega \in \Omega$. Note that every compact random operator is totally bounded, but the reverse implication may not hold. However, two notions are equivalent on a bounded subset of a Banach space X. Finally the random operator $T : \Omega \times X \to X$ is called contraction if for each $\omega \in \Omega$,

$$\|T(\omega)x - T(\omega)y\| \le k(\omega)\|x - y\| \quad (1.1)$$

for all x, $y \in X$, where $0 \le k(\omega) < 1$.

A **Kuratowskii measure** α of noncompactness of a bounded set A in X is a non-negative real number $\alpha(A)$ defined by

$$\alpha(A) = \inf\left\{ r > 0 : A = \bigcup_{i=1}^{n} A_i; \mathrm{diam}\,(A_i) \le r, \forall\ i \right\}. \quad (1.2)$$

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The chapter presents three examples that indicate the relationship between differential and integral equations. In addition to random integral equations that arise.In this article we present a brief survey of some of the general methods that have been used, are being used, and will be used to obtain approximate solutions of.Random Integral Equations. Front Cover. Bharucha-Reid. Academic Press, Mar 2 , - Computers - pages.The Matrix Golden Mean and Its Applications to Riccati Matrix Equations Convergence Characteristics of Random Integral Equations (A. T. Bharucha- Reid).Chapter Some Random Integral Equations of the Volterra Type . overall theory of random integral equations, whereas we emphasize the.Bharucha-Reid, A. T. On random solutions of Fredholm integral equations. Bull. Amer. Math. Soc. 66 (), no. 2, Random Integral Equations [A. T. Bharucha-Reid] on fizzysrattor.com *FREE* shipping on qualifying offers.PDF   In this paper, we present the existence and uniqueness of random solution of a random integral equation of Volterra type on time scales. We also study the.A new method for the numerical integration of the random integral equation arising in the computer simulation of stochastic transport equations is proposed.In this paper algorithms are given for the numerical solution of random Fredholm integral equations of the second kind. These algorithms are based on the.Approximate solution of random integral equations: general methods. Article in Mathematics and Computers in Simulation 26(4)from experience theory are stated in section 6. General theorems on random integral equations are given in section 7, whereas section 8 is devoted to the.study of random nonlinear Volterra integral equations. In this paper, we obtain theorems on the existence, uniqueness, boundedness and stability of solutions of .Some stochastic versions of deterministic fixed point theorems for Hardy-Rogers self mappings and stochastic integral equations are obtained.Existence theory for nonlinear random integral equations using the Banach- Steinhaus 1 Bharucha-Reid, A. T., Random Integral Equations, New York, Two basic forms of non-linear random integral equations are studied and where being the underlying set of a complete probability measure space (fi, A, P).