

EXISTENCE OF SOLUTIONS FOR ABSTRACT NONLINEAR INTEGRODIFFERENTIAL EQUATION VIA S - ITERATION METHOD

Rupesh T. More¹ and Haribhau L. Tidke²

¹Department of Mathematics
rts, Commerce and Science College, Bodwad, Jalgaon-425 310, India

²Department of Mathematics
Kavayitri Bahinabai Chaudhari North Maharashtra University, Jalgaon, India

Abstract. In this paper, we study the existence, uniqueness and other properties of solutions of abstract nonlinear Volterra integrodifferential equation with nonlocal condition. The tool employed in the analysis is based on application of S - iteration method. S -iteration method makes an equally significant contribution to study various properties such as dependence on initial data, closeness of solutions and dependence on parameters and functions involved therein.

Keywords. Existence ,uniqueness and continuous dependence; abstract integrodifferential equation; Normal S - iterative method; Continuous dependence; Closeness; Parameters.

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1 Introduction

Let X be a Banach space with norm $\|\cdot\|$. Let $B = C([t_0, b]; X)$ be Banach space of all continuous functions from $[t_0, b]$, $t_0 > 0$ $b > 0$ into X , endowed with the norm

$$\|x\|_B = \sup\{\|x(t)\| : x \in B\}, \quad 0 \leq t_0 \leq t \leq b.$$

We consider the following nonlinear Volterra integrodifferential equation with nonlocal condition of the type:

$$x'(t) + Ax(t) = f(t, x(t), \int_{t_0}^t a(t, s)k(s, x(s))ds), \quad t \in [t_0, b], \quad (1)$$

$$x(t_0) + g(x) = x_0, \quad (2)$$

where $-A$ is the infinitesimal generator of a C_0 -semigroup $T(t)$, $t \geq 0$, on a Banach space X and functions $f : [t_0, b] \times X \times X \rightarrow X$, $g : B \rightarrow X$, $k : [t_0, b] \times X \rightarrow X$, $a : [t_0, b] \times [t_0, b] \rightarrow R$ are continuous and x_0 is a given element of X . The nonlocal condition, which is a generalization of