Nonlinear Dynamics and Systems Theory, **15** (3) (2015) 321–333

Approximate Controllability of Semilinear Stochastic Control System with Nonlocal Conditions

Anurag Shukla*, N. Sukavanam, D.N. Pandey

Department of Mathematics, Indian Institute of Technology Roorkee, India

Received: March 29, 2015; Revised: June 23, 2015

Abstract: In this paper we study the approximate controllability of semilinear stochastic control system with nonlocal conditions in a Hilbert space. Nonlocal initial condition is a generalization of the classical initial condition and is motivated by physical phenomena. The results are obtained by using Sadovskii's fixed point theorem. At the end, an example is given to show the effectiveness of the result.

Keywords: *approximate controllability; semilinear systems; stochastic control system; Sadovskii's fixed point theorem.*

Mathematics Subject Classification (2010): 34K30, 34K35, 93C25.

1 Introduction

Controllability concepts play a vital role in deterministic control theory. It is well known that controllability of deterministic equation is widely used in many fields of science and technology. Kalman [23] introduced the concept of controllability for finite dimensional deterministic linear control systems. The basic concepts of control theory in finite and infinite dimensional spaces have been introduced in [31] and [24] respectively. However, in many cases, some kind of randomness can appear in the problem, so that the system should be modelled by a stochastic form. Only few authors have studied the extensions of deterministic controllability concepts to stochastic control systems. Klamka et al. [11]-[12] studied the controllability of linear stochastic systems in finite dimensional spaces with delay and without delay in control as well as in state using Rank theorem. In [17]-[22], Mahmudov et al. established results for controllability of linear and semilinear stochastic systems in Hilbert space. Instead of this, Sakthivel, Balachandran, Dauer and Bashirov et al. studied the approximate controllability of nonlinear stochastic systems

* Corresponding author: mailto:anuragshukla259@gmail.com