

ARTICLE IN PRESS

Topological Methods in Nonlinear Analysis
DOI: 10.12775/TMNA.2024.004

© 2024 Juliusz Schauder Centre for Nonlinear Studies
Nicolaus Copernicus University in Toruń

A STUDY ON APPROXIMATE CONTROLLABILITY OF EVOLUTION SYSTEMS WITH NONLOCAL CONDITIONS

HAIDE GOU

ABSTRACT. The purpose of this paper is to present the existence of mild solutions and approximate controllability for a class of non-autonomous measure driven evolution systems with nonlocal conditions in Banach spaces. Firstly, we obtain the existence of mild solutions for the concerned problem by the semigroup theory and Schauder's theorem. Secondly, some sufficient conditions of approximate controllability are proved. At the end, an example is also given to illustrate the feasibility of our theoretical results.

1. Introduction

The theory of measure differential equations covers some well known cases. When give an absolutely continuous function, a step function, or the sum of an absolutely continuous function with a step function, this kind of system corresponds to usual ordinary differential equations, difference equations or impulsive differential equations, respectively. Another advantage of considering measure differential equations is that we can possibly model Zeno trajectories because a function of bounded variation may exhibit infinitely many discontinuities

2020 *Mathematics Subject Classification.* 26A42, 34A38, 34K30, 34K35, 93B05.

Key words and phrases. Approximate controllability; evolution family; Lebesgue–Stieltjes integral; measure driven evolution equation.

The author was supported in part by the National Natural Science Foundation of China (Grant No. 11661071, 12061062), Science Research Project for Colleges and Universities of Gansu Province (No. 2022A-010), Lanzhou Youth Science and Technology Talent Innovation Project (2023-QN-106) and Project of NWNLU-LKQN2023-02.