



Gradient Optimal Control Problems for a Class of Infinite Dimensional Systems

M. O. Sidi* and S. A. Beinane

RT-M2A Laboratory, Mathematics Department, College of Science, Jouf University, P.O. Box: 2014, Sakaka, Saudi Arabia.

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Abstract: In this work, we address the issue of optimal control for a class of bilinear systems. The goal is to achieve approximately a desired gradient on the whole domain by seeking the minimum of a function. Next, optimization methods are used to reach the desired subregion gradient at time T . The proposed methods are illustrated by a theoretical approach and algorithm.

Keywords: *infinite dimensional systems; gradient problems; regional problems; algorithm.*

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1 Introduction

Infinite-dimensional systems are present in many problems. The analysis of such systems regroup many concepts such as stability, exact controllability, approximate controllability [2, 4, 5]. Nonlinear dynamics is of interest to mathematicians because most systems are nonlinear in nature. The multiplication of state and control in bilinear dynamics make them an important subclass of nonlinear systems, such nonlinearity appears in many dynamical process, for example, a convective-diffusive fluid problem used in [6] to remove a contaminant from water and control of velocity in a Kirchhoff plate, see [4]. Bichiou et al. in [3] treated an approach for the minimum time control of dynamical systems. Alharbi et al. in [1] studied the immune system using vitamins intervention. Regional controllability is a very important generalization referring to the optimal control problems in which the target is studied particularly on a subregion ω .

* Corresponding author: <mailto:maawiya81@gmail.com>