



On the Stabilization of Infinite Dimensional Bilinear Systems with Unbounded Control Operator

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Abstract: In this paper, we deal with regional stabilization of infinite dimensional bilinear system evolving in a spatial domain Ω with unbounded control operator. It consists in studying the asymptotic behaviour of such a system in a subregion ω of Ω . Hence, we give sufficient conditions to obtain weak and strong stabilization on ω . An example and simulations are presented.

Keywords: *infinite dimensional bilinear systems; unbounded control operator; regional stabilization.*

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1 Introduction

Bilinear systems constitute an important subclass of nonlinear systems. The nonlinearity in mathematical models appears in the multiplication of state and control in the dynamical process. Bilinear systems model several phenomena in nature and in industry, e.g. the mass action law in chemistry, the transfer of heat by conduction convection in energetic systems, the generation of cells via cellular division, and the dynamics of the blood's organs in biology [4]. Yet, the modeling may give rise to an unbounded control operator which allows us to describe some interesting phenomena when the control is acting in regions or on a boundary or when the measure is taken at some sensing point. The problem of feedback stabilization of distributed systems has been studied in many works along with various types of controls [1–3, 5].

The question of regional stabilization for linear systems was tackled and developed by Zerrik and Ouzahra [7], and consists in studying the asymptotic behaviour of a distributed

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