



Stabilizing Sliding Mode Control for Homogeneous Bilinear Systems

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Abstract: The stabilization of homogeneous bilinear systems constitutes the main interest of this paper. A sliding mode control is suggested and a stability study is held leading to sufficient conditions of global stabilization. The sliding surface is determined through the resolution of the nonlinear constraints of stabilization. Simulations on numerical examples are presented proving the effectiveness of the proposed approach.

Keywords: *homogeneous bilinear systems; sliding mode control; stabilization.*

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1 Introduction

Bilinear systems constitute an important class of nonlinear systems. Since their introduction in the early sixties, they have got great interest and have been used to model processes in several fields; biologic, ecologic, economic, social ... [4, 16, 17]. As they are partially linear in state and in input without being jointly linear in both, they constitute a gateway between linear and nonlinear systems and that's why they need special attention in their study. In the last decades, many researchers investigated the control design and the stability analysis of this special category of systems [1, 9, 13, 15, 19, 20].

Many results in this field are yet demonstrated, since the stabilization by linear or quadratic state feedback has been widely treated especially for non homogeneous bilinear systems. However it was shown that there exists a large class of homogeneous bilinear systems which can not be stabilized by a continuous feedback even in planar case [6]. In fact for this type of systems the relative degree isn't defined in zero and the linearized

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