

STABILIZATION OF A CLASS OF SWITCHED NONLINEAR SYSTEMS

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Abstract. The stabilization of a class of single input switched nonlinear systems is investigated in the paper. The system concerned is of switched triangular structure, which has all switched models in triangular form. The stabilization of the switched system under arbitrary switching law is investigated. The nonlinear state feedback is explicitly designed. We exploit the structural characteristics of the switched nonlinear systems to construct a common Lyapunov function for arbitrary switching.

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1 Introduction

A switched system is a dynamical system described by a family of continuous time subsystems and a rule that governs the switching between them. In recent years, the study of switched systems has received more and more attention. The motivation for studying switched systems comes partly from the fact that many practical systems are inherently multimodel in the sense that several dynamical systems are required to describe their behavior which may depend on various environmental factors, and from the fact that the methods of intelligent control design are based on the idea of switching between different controllers. For example, chemical processes, transportation systems, computer controlled systems and communication industries can be modeled as switched systems.

Stability issues have been a major focus in studying switched systems. There has been increasing interest in the stability analysis and design methodology recently in the literature about switched systems [1-5]. Because of the interaction between continuous dynamics and discrete dynamics, switched