



On the Global Asymptotic Stability of a Class of Nonlinear Switched Systems

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Abstract: In this paper, a class of nonlinear switched systems with separable nonlinearities is studied. With the aid of multiple Lyapunov functions method, conditions on switching law are derived under which the zero solutions of the considered systems are globally asymptotically stable. Some examples are presented to illustrate the obtained results.

Keywords: *hybrid systems; switching law; global asymptotic stability; multiple Lyapunov functions.*

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1 Introduction

Switched systems represent a subclass of hybrid systems and have strong engineering background in various applications. A significant number of real systems can be modeled as switched systems such as mechanical systems, chemical processes, vehicle control, traffic control, automotive industry, etc. [3, 11, 18, 23, 24].

A switched system has two components: a family of subsystems and a switching signal. Subsystems in the family are described by a set of indexed equations. The switching signal selects an active subsystem at every instant of time, i.e., the subsystem from the family that is currently being followed [18]. Switching signals are usually classified as time-dependent or state-dependent. Note that qualitative behaviour of a switched system depends not only on the behaviour of individual subsystems in the family, but also on the switching signal [24].

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