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NEW RESULTS ON QUADRATIC STABILIZATION OF SWITCHED LINEAR SYSTEMS

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Abstract. This paper considers the quadratic stabilization problem of multi-input planar switched systems. Based on some basic lemmas, some uniformly quadratic stabilization criteria are established. Furthermore, an example is given to illustrate our results in this paper.

Keywords. Switched systems, switched linear systems, switching signal, quadratic stabilization, uniformly quadratic stabilization.
AMS (MOS) subject classification: 93D10, 93C55, 93D15.

1 Introduction

Switched systems are a class of hybrid systems consisting of several subsystems and a switching law that specifies which subsystem will be activated along the system trajectory at each instant of time. Switched systems deserve investigation for theoretical development as well as for practical applications. It is an essential feature of many control systems to switch among different system structures, for example, power systems, traffic management systems, computer disk drives and so on. In the last decade, switched systems have received growing attention [1-7] and have been studied from various viewpoints. [3] provided a survey of recent development in stability and design of switched systems.

There has been some work on quadratic stabilizability of switched systems. For switched systems $\dot{x}(t) = A_{r(t)}x(t)$, [4] first provided a sufficient quadratic stabilization condition. Then, [2] proved that this sufficient condition is also necessary for the case $N = 2$, where N is the number of subsystems. [7] extended these results to discrete-time switched systems. For switched systems with control input, [6] derived parallel results. Recently, [1] studied the quadratic stabilizability of single-input planar switched systems from another viewpoint and gave a complete characterization of quadratic Lyapunov function by solving a set of linear inequalities. .

Motivated by the above discussions, in this paper, we aim to derive some uniformly quadratic stabilization (i.e., quadratic stabilization under arbitrary