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# PRACTICAL SET STABILITY OF SWITCHED LINEAR SYSTEMS

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**Abstract.** In this paper, we first give the concepts of $\varepsilon$-practical set stability of switched system and then investigate the $\varepsilon$-practical set stability of switched linear system with no common equilibrium. For given $\varepsilon > 0$, we get the set $\Gamma$ and obtain some sufficient conditions which guarantee the switched system is $\varepsilon$-practically set stable with respect to $\Gamma$. An example is given to illustrate the results.

**Keywords.** $\varepsilon$-practical set stability, $\varepsilon$-practical set asymptotical stability, $\varepsilon$-practical set exponential stability, dwell time, switched linear system.

**AMS (MOS) subject classification:34H05, 34D99,93C15,93D99**.

# 1 Introduction

It is well known that the theory of stability in the sense of Lyapunov has got rich results and could be widely used in solving problems of the real world. In some cases, a system may be stable in the sense of Lyapunov, yet the stable domain of system may be so small that the system is useless. On the other hand, some systems may be mathematically unstable, yet the system oscillates so small that its performance is acceptable. To deal with these cases, LaSalle and Lefschetz[1] first introduced the concept of practical stability, and V. Lakshmikantham et al. presented a systematic study for the theory of practical stability[2]. Just like the classical Lyapunov stability theory, practical stability can give both qualitative behavior and quantitative analysis, such as trajectory bounds, etc.

Recently, the concept of practical stability has been extended by X. Xu and P.J. Antsaklis[3] in dealing with integrator switched system. X. Xu et al. have noted that, with appropriate switching law, switched system whose subsystems have different equilibria or even none may still exhibit interesting behaviors[6,7]. Such behaviors are defined as practical stabilizability(local behavior) and practical asymptotic stabilizability(behavior in a lager region)[7]. Many fruitful results on the analysis of practical stability and the designed problems of practical stabilization have been reported in the literature (see X. Xu, P.J. Antsaklis (2003), X. Xu, G. Zhai (2005), X. Xu, G. Zhai, S. He (2008, 2010), and the references therein).