Dynamics of Continuous, Discrete and Impulsive Systems
Series **B:** *Applications & Algorithms* **16 (2009)** 167-180
 http://www.watam.org

ROBUST TRACKING CONTROL FOR SWITCHED LINEAR SYSTEMS WITH TIME-DELAY: AN AVERAGE DWELL TIME APPROACH

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Abstract. Robust tracking control for switched linear systems with time-delay is investigated in this paper. Sufficient conditions for the solvability of robust tracking control problem are developed. Based on the theories of functional differential equations, the norm bound of the reference state of time-delay system is given. An average dwell time approach and piecewise Lyapunov functional method are utilized to design the switching control laws. By using linear matrix inequalities, the controller design problem can be solved efficiently. A simulation example shows the effectiveness of the proposed switching control laws.

Keywords. Switched linear systems, time-delay, tracking control, average dwell time, linear matrix inequalities (LMIs).

AMS (MOS) subject classification: 93C30, 93D05, 93D15.

1 Introduction

As an important class of systems, time-delay systems are ubiquitous in chemical process, aerodynamics, and communication network, see, e.g., [2], [5], [9], [10]. It is well known that time-delay is great source of instability and poor performance, therefore, how to deal with time-delay has been a hot topic in the control area [3], [6], [7], [14], [17].

On the other hand, switching control provides a new technique to the stability analysis and control synthesis for complex control systems (e.g., nonlinear systems, uncertain systems and parameter varying systems). Due to their significance both in theory development and practical applications, switched systems have been attracting considerable attention during the last decades, see e.g., [8], [11], [16], [20], [26]. Two key problems in the study of switched systems are the stability analysis and control synthesis. It has been shown that average dwell time approach is an effect tool for choosing certain