International Journal of Innovative
Computing, Information and Control
Volume 4, Number 9, September 2008

 ISSN 1349-4198
pp. 2295–2304

ROBUST STATIC OUTPUT FEEDBACK CONTROL FOR STOCHASTIC HYBRID SYSTEMS

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Received July 2007; revised December 2007

Abstract. *This paper deals with the stabilization problem for a class of uncertain stochastic systems with Markovian jumps via the static output feedback control, where the uncertain parameters are norm bounded. A static output feedback controller that makes the closed-loop systems asymptotically mean-square stable is designed, which is obtained by solving some linear matrix inequalities.*

Keywords: Markovian jumps, Stochastic systems, Stabilization, Static output feedback control, Linear matrix inequality (LMI)

1. **Introduction.** The main interest in the study of jump systems lies in the fact that such a system works in a way that it switches from one mode to another randomly and the switching is governed by a Markov process with discrete and finite state space. Therefore, jump system models can be used to describe the behavior of many physical and economic systems. Since the pioneering work on quadratic control of linear jump systems in 1960s [1,2,4], jump systems have drawn a lot of attention during the past four decades and noticeable achievements have been made on controller design, filtering and stability analysis of linear jump systems [3,5,8,9]. On the other hand, jump systems with random structures, namely, *hybrid systems*, have also been studied by many researchers due to the important applications in engineering such as random failure process in manufacturing systems or electric power systems with abrupt changes, breakdowns of components, *etc.* The main results about stability, stabilizability, H_∞ control problem and filtering problem of this class of systems can be found in [10,12,13].

In recent years, some researchers have turned their attention to the study of stochastic systems with Markovian jumps, for which, the system state is expressed by a stochastic Itô equation but with the coefficients randomly containing a Markov jump process. Such more general class of stochastic control problems have been investigated and some problems have been solved. Among these works, we only quote those on stability, stabilizability and linear quadratic control problem, see [11,14,15,17,18,20]. For such system models, the state feedback stabilization [11], optimal filtering [14] and linear quadratic regulator [15] have been well studied.

An important issue in control theory is the design of static output feedback, which has widely practical applications in engineering. The main problems in this field can be found in the survey papers [16,19], [21]. In finite-dimensional linear time-invariant