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DELAY-DEPENDENT H_∞ CONTROL FOR DISCRETE-TIME MARKOVIAN JUMP SYSTEMS WITH TIME-VARYING DELAYS AND PARTLY UNKNOWN TRANSITION PROBABILITIES

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Abstract. This paper is concerned with the H_∞ stabilization problem via dynamic output feedback controller for discrete-time Markovian jump systems (MJPSs) with time-varying delays and partly unknown transition probabilities. Sufficient delay-dependent stabilization conditions for the existence of output feedback controller are proposed in terms of linear matrix inequalities (LMIs) with equality constraints via a new technique to deal with the case where some elements in transition probability matrix are inaccessible. Since the obtained criteria are not strict LMI conditions, an effective algorithm is suggested to solve the matrix inequalities characterizing the output feedback controller solutions. Finally, illustrative examples are proposed to show the effectiveness of the proposed approach.

Keywords. Discrete-time Markovian jump systems, partly unknown transition probabilities, time delays, output feedback, H_∞ control

AMS (MOS) subject classification: This is optional. But please supply them whenever possible.

1 Introduction

Markovian jump systems can be regarded as a special class of hybrid systems with finite operation modes whose structures are subject to random abrupt changes, which may result from abrupt phenomena such as random failures and repairs of the components, changes in interconnections of subsystems, sudden environmental changes, modification of the operating point of a linearized model of a nonlinear systems, and so on. The studies of MJPSs are important in practical applications such as manufacturing systems, aircraft control, target tracking, robotics, solar receiver control, and power systems. Since MJSs firstly introduced by Krasovskii and Lidskii in 1961, a great deal of attention has been devoted to the study of this class of systems, for instance