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GENERALIZED H_2 FINITE TIME CONTROL FOR POLYTOPIC LINEAR DIFFERENTIAL INCLUSION SYSTEM

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Abstract. This paper is concerned with generalized H_2 finite time control for polytopic linear differential inclusion systems(PLDIs). First, the definition of generalized H_2 finite time control is presented. Second, by using the descriptor system approach, sufficient conditions are derived and a state feedback is designed to guarantee finite time boundedness of the closed-loop system, and to restrict the effect of disturbance on a prescribed level. These sufficient conditions are established by using linear matrix inequalities(LMIs). Finally, an example is given to illustrate the effectiveness of the proposed method.

Keywords. Generalized H_2 finite time control; Polytopic linear differential inclusions; descriptor systems; Finite time boundedness; Linear matrix inequalities.

1 Introduction

In control field, much work focuses on the robust Lyapunov stability, i.e., to make the state converge to zero within a maybe infinite time interval. However, in practice, one is more interested in what happens over a finite time interval rather than an asymptotical property. To study the performance in a finite time interval of system, the definition of finite time stability (FTS) is proposed in [6]. Amato extends this definition to finite time boundedness (FTB) and deals with the behavior of the state in the presence of external disturbances[1]. Meanwhile, the conclusions on FTS and FTB problems are presented by using LMIs, e.g., [2,3,7,10,16]. In [2], the finite time stabilization via dynamic output feedback is considered. Finite time control of discrete-time linear system is dealt with in [3]. In [16], the authors consider finite time control of discrete-time systems with time-varying exogenous disturbance. In [7], the authors investigate the finite time control of linear singular systems with parametric uncertainties and disturbances. Finite time H_∞ control for linear continuous system with norm-bounded disturbance is presented in [10].