ON ROBUST H_∞-CONTROL OF UNCERTAIN IMPULSIVE SYSTEMS

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Abstract. In this paper, the problems of robust stability, stabilization and H_∞-control for uncertain impulsive systems are investigated. The parametric uncertainties are assumed to be time-varying and norm-bounded. New sufficient conditions for the above problems are derived in terms of linear matrix inequalities. The numerical examples are given which illustrate the the applicability of the theoretical results.

Keywords. Uncertain impulsive system, robust stability, robust stabilization, H_∞-control, linear matrix inequality (LMI).

1 Introduction

Many evolutionary processes are subjected to short temporary perturbations, that are negligible compared to the process duration. Thus the perturbations act instantaneously in the form of impulses. For example, biological phenomena involving thresholds, bursting rhythm models in pathology, optimal control of economic systems, frequency-modulated signal processing systems do exhibit impulse effects. Impulsive differential systems provide a natural description of observed evolutionary processes with impulse effects.

The stability of impulsive systems has been extensively studied in the literature, we refer to [1]-[6] and the references therein. Observation control using impulse feedback design was considered in [7]. The state feedback stabilization problem of linear measure-type impulsive systems was investigated in [8], [9]. Recently, the analysis and control problems for impulsive systems with external disturbance have received considerable interests. In [17], the concepts of input-to-state (ISS) and integral-ISS to impulsive systems were introduced and a set of Lyapunov-based sufficient conditions for these properties were established. In [13], the dissipativity theory for nonlinear impulsive systems was developed. In [14], [15], the problem of persistent bounded disturbance rejection for linear impulsive system was investigated and an LMI approach to the design of state feedback controller was presented. In [16], the problems of robust H_∞ control for uncertain impulsive stochastic systems