Dynamics of Continuous, Discrete and Impulsive Systems
Series **B:** *Applications & Algorithms* **13 (2006)** 715-728

DECENTRALIZED ROBUST CONTROL FOR UNCERTAIN IMPULSIVE STOCHASTIC SYSTEMS

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Abstract. This paper works on the decentralized robust H_∞ control of interconnected impulsive stochastic systems with uncertainties. The uncertainties are assumed to be time-varying and norm-bounded. For the uncertain interconnected impulsive stochastic system a robust decentralized state feedback controller is designed under which the resulting closed-loop interconnected impulsive stochastic system is internally robustly asymptotically stable in the mean square and ensures a prescribed level of H_∞ performance for all admissible uncertainties. A sufficient condition for the implementation of the robust H_∞ control and the design of a robust decentralized state feedback control law is given in terms of linear matrix inequalities (*LMIs*). A numerical example is provided to demonstrate the effectiveness of the proposed design approach.

Keywords. Decentralized control, H_∞ control, Interconnected stochastic systems, Impulsive systems, *LMIs*.

AMS (MOS) subject classification: 34A37, 93D15, 94E03

1 Introduction

It happens commonly in many real systems that their states are subjected to rapid changes during their processes. Sometimes, it is convenient and valid to neglect the duration of the rapid changes and assume that the changes can be represented by the jumps of system states and/or system parameters at certain moments. Impulsive dynamical systems are used to characterize such dynamical processes. Therefore, in various fields such as neural networks, rhythm in mechanics, radio engineering, communication systems, biological systems, and so on, there exist many dynamical processes which can be described by impulsive systems. Impulsive dynamical systems have been studied intensively in the past decades [1, 4, 7, 8, 9, 14]. Impulsive control problems could be formulated for different classes of systems. We notice that there are some significant results working on impulsive control problems of non-stochastic system models such as nonlinear systems [5], uncertain systems [6], large scale systems [3, 9], switched systems [11], etc..