Dynamics of Continuous, Discrete and Impulsive Systems
Series **A:** *Mathematical Analysis* **11 (2004)** 761-770

DESIGN OF DECENTRALIZED GENERALIZED STATE OBSERVER

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Abstract. In this paper, the problem of the estimation of the generalized state for interconnected control descriptor systems is discussed. Under certain conditions, the existence and algorithm for the decentralized generalized state observer are investigated. Furthermore, it is pointed out that the controller and observer are still of separation property when they are used in the closed loop control.
Keywords. decentralized generalized state observer, interconnected descriptor systems, separation property, structural stability.
AMS (MOS) subject classification: 65N30.

1 Introduction

Recently, a great number of significant progresses have been made in the study of the generalized state observer for the concentrated control systems [1], [2], [3], [4]. It is natural to consider the generalized state observer for the decentralized control systems. In [5], the generalized state has been applied as the decentralized feedback control variable to deal with the robust decentralized control problems. In practice, the state variables of the systems can not always been measured directly. Therefore, constructing a state observer to estimate the generalized state is necessary for the feedback control problem.

The purpose of this paper is to design a decentralized generalized state observer with the structural stability. The existence of such observer and its applications in the closed-loop control systems are discussed in depth. Some other significant results are also obtained in this paper. The generalized state observer derived in this paper has low sensitivity to disturbance. As far as we know, at present, this is the first work on the estimation of the decentralized generalized state.