

## A NEW SCHEME FOR THE DECENTRALIZED STABILIZATION OF LINEAR LARGE SCALE SYSTEMS

CHAOYONG JIN and XIANGWEI ZHANG

( Received December 27, 2005 )

Submitted by K. K. Azad

### Abstract

This paper is concerned with the decentralized stabilization of input-decentralized linear large-scale systems. Three concepts called strength of stability of subsystems, strength of connection between subsystems and aggregating parameter matrix of overall system are formulated, then two criteria for the existence of a decentralized state feedback controller which guarantees the asymptotical stability of closed-loop system are derived by using Lyapunov theory, and an algorithm for designing such controller is proposed. A numerical example is given to illustrate the application of the results obtained in this paper.

### 1. Introduction and Problem Formulation

Let  $\Sigma$  be an input-decentralized linear large-scale system composed of  $N$  interconnected subsystems  $\Sigma_i$  described by,

$$\Sigma_i : \dot{x}_i(t) = A_i x_i(t) + B_i u_i(t) + \sum_{j=1, j \neq i}^N A_{ij} x_j(t), \quad (1)$$

2000 Mathematics Subject Classification: 93C05.

Keywords and phrases: large-scale systems, decentralized stabilization, aggregating parameter matrix,  $M$ -matrix, Riccati equation.

Project supported by Provincial Natural Science Foundation of Guangdong, China (No. 04105386).

© 2007 Pushpa Publishing House