Dynamics of Continuous, Discrete and Impulsive Systems
Series **A:** *Mathematical Analysis* **11 (2004)** 797-807

LINEARIZING APPROACH TO DECENTRALIZED CONTROLLABILITY

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Abstract. In this paper, the problem of the controllability for decentralized control descriptor systems is investigated. The necessary and sufficient conditions for the R-controllability, I-controllability, S-controllability and C-controllability are given respectively by introducing the concept of linearization of the closed loop characteristic polynomial of the systems. Also, some related topics such as fixed modes are discussed.
Keywords. decentralized control, descriptor systems, controllability, linearized structure
AMS (MOS) subject classification: 65N30.

1 Introduction

Controllability is another important basic concept in decentralized control systems. It is different from fixed modes but they are equivalent in given conditions. Under the assumption that one subsystem of systems is decentralizedly controllable and decentralizedly observable, centralized control may be adopted, and some good properties in central control systems are obtained. Especially, controllability may be extended to time-domain decentralized control systems, such that the related stability problems can be solved. This can not be done by using fixed modes. Therefore, controllability is emphasized and studied in decentralized control. At present, besides geometric method [1],

The shortage is that the relation between decentralized controllability and related control problems (for instance pole placement) can not be obtained from these expressions directly.

In this paper, the concept of linearization is introduced, the problems of *R*-controllability, *I*-controllability, *S*-controllability and *C*-controllability for decentralized control descriptor systems are investigated. For description and inference of relevant conclusion, unified form and approach are given.