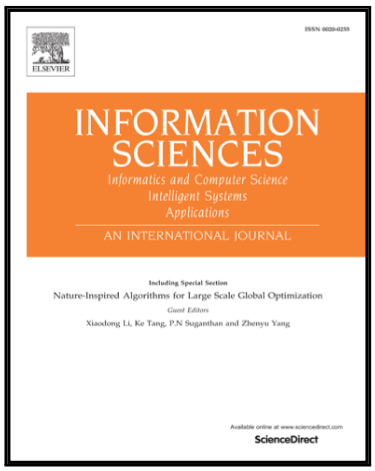

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Decentralized fault-tolerant control for a class of nonlinear large-scale systems with actuator faults

Chao Deng * and Guang-Hong Yang †

Abstract

This paper considers the decentralized fault-tolerant control for a class of nonlinear large-scale systems with actuator faults containing stuck, outage and loss of effectiveness. By Takagi-Sugeno fuzzification, each subsystem of the nonlinear large-scale systems is described in the form of a Takagi-Sugeno fuzzy model with nonlinear interconnections. Under the assumption that each nominal local subsystem model shares the same input matrix, the matrix full rank factorization technique is used to present a decentralized sliding mode fault-tolerant controller to compensate the actuator faults and interconnections. In addition, it is proved that the proposed decentralized controller guarantees the asymptotically stability of the closed-loop systems. Finally, three simulation examples are given to illustrate the effectiveness of the proposed controller.

Key words: Fault-tolerant control (FTC); matched uncertainty; linear matrix inequalities (LMIs); Takagi-Sugeno (T-S) fuzzy model; large-scale systems

1 Introduction

Recently, large-scale systems, which are composed by a group of interconnected subsystems, have been widely studied due to its widespread applications in multiple fields including

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