International Journal of Innovative Computing, Information and Control
Volume **2**, Number **1**, February **2006**

ICIC International ©2006 ISSN 1349-4198
pp. 61–68

H_∞ FUZZY TRACKING CONTROL FOR MULTI-MACHINE INTERCONNECTED POWER SYSTEM WITH MODEL UNCERTAINTIES

Jiquan Sun

School of Materials Science & Engineering
University of Science & Technology Beijing
No.30, Xueyuan Road, Haidian District, Beijing 100083, China
sjq1959@163.com

Kuniaki Fujimoto

School of Engineering
Kyushu Tokai University
9-1-1, Toroku, Kumamoto 862-8652, Japan
kfuji@ktmail.ktokai-u.ac.jp

Chunxia Dou, Jiaqing Zhong and Shiwen Yuan

College of Electrical Engineering
Yanshan University
Qinghuangdao 066004, China

Received February 2005; revised September 2005

Abstract. *Because the multi-machine power system is a nonlinear huge-dimension interconnected system with model uncertainties, it is difficult to achieve stable tracking control for the system. However, every single-machine subsystem of the power system can be approximated by a set of fuzzy models, every fuzzy model represents a linearized model of the subsystem corresponding to the operating point of the controlled system. In fact, in many cases it is very difficult to estimate accurately many parameters of the dynamic behavior of the power system, namely, the system model is uncertain, there are modeling errors between the fuzzy models and the practice system. Based on these fuzzy models, considering the model uncertainties, a new H_∞ fuzzy tracking control scheme is proposed, the tracking control for the multi-machine interconnected power system with model uncertainties is achieved in this paper. A linear matrix inequality (LMI) is employed to represent the feedback controller, the parameters of the controller are obtained using convex optimization techniques of LMI. The stability of the system is also guaranteed. The stable tracking performances are tested by simulation examples.*

Keywords: Power system, Fuzzy model, Modeling error, H_∞ fuzzy tracking control, Linear matrix inequality (LMI)

1. **Introduction.** Because scale of power systems becomes bigger and bigger and power electron technique is widely applied in power systems, many power systems have huge-dimension and interconnected nonlinear systems. As a result, more and more people have an interest in the control problems of power systems [1]. But there are less reports on the