I-FP04 Intelligent Control 2

13:00-15:00 **Chair : Kimura Hidenori(Tokyo Univ.)**
Room : C203 **Co-Chair : Lee Sang Gu (Hannam Univ.)**

13:00 – 13:20 **D-FP04-1**

Evolutionary design of Takagi-Sugeno type fuzzy model for nonlinear system identification and time series

Min-Soeng Kim and Ju-Jang Lee
(KAIST)

An evolutionary approach for the design of Fuzzy Logic Systems(FLSs) is proposed. Membership functions(MFs) in Takagi-Sugeno type fuzzy logic system is optimized through evolutionary process. Output singleton values are obtained through pseudo-inverse method. The proposed technique is unique for that, to prevent overfitting phenomenon, limited-level RBF membership functions are used and the new fitness function is invented. To show the effectiveness of the proposed method, some simulations results on model identification are given.

13:20 – 13:40 **D-FP04-2**

Fuzzy PI with Gain Scheduling Control for a Flexible Joint Robot

Thana Pattaradej, Ketsara Chumsawee, and Pitikhate Sooraksa
(King Mongkut Institute of Technology Ladkrabang)

This paper presents the implementation of fuzzy PI gain scheduling controller (FPICGS) for controlling flexible joint robot arms with uncertainties from time-varying load. The term FPICGS is called based on a combination of fuzzy PI control scheme with a set of rule bases. Principle of design for a FPICGS is given along with the implementation of the designed computer aided control system. The experiment reveals an effectiveness of the proposed control scheme for flexible joint robot arms driven by a DC motor hooked with a spring which both parameters are completely unknown parameters...

13:40 – 14:00 **D-FP04-3**

The Cascade PID Type Fuzzy Control Method

Jung Hoon Lee, Ki whan Eom (Dongguk Univ.), Yong Gu Lee.
(Hallym College of Information & Industry)

We propose the cascade PID type fuzzy control method for a good performance such as robustness. The one of proposed method, the first stage have two input variables of an error and a derivative error, and one output variable, and the next stage have two input variables of the output of first stage and an integral error, and one output variable, have two stages. The other, the first stage has one input of an error, and one output variable, and the second stage have two input of the output of first stage and a derivative error, and one output variable, and the third stage have two input of the output of the second stage and an integer error, and one output variable...

14:00 – 14:20 **D-FP04-4**

Direct Just-in-time Methods for Nonlinear Control Design

Qiubao Zheng, Hidenori Kimura(Univ. of Tokyo)

Based on input and output data pairs of nonlinear systems, this paper proposes a simple and effective Just-In-Time (JIT) method, called Direct JIT Control, for nonlinear control design. It uses an inverse model of controlled plant to compute an initial control action, and then adapts the initial control action by adding a fine-tuning control action, depended on the errors between the real outputs and the expected reference signals. Meanwhile, the proposed JIT method accomplishes the adaptation of the inverse model just simply by means of the refreshment of input and output data pairs. In addition, the JIT modeling technique guarantees this method to obtain an approximate inverse model of the controlled nonlinear plant in the neighborhood of a query. Based on a ...

14:20 – 14:40 **D-FP04-5**

A Control Method for Unknown Chaotic Systems *

Yoshimasa Shimizu, Michio Miyazaki (Kanto Gakuin Univ.), Hee-Hyol Lee(Fukuoka Institute of Technology), Sang-Gu Lee(Hannam Univ.), Kageo Akizuki(Waseda Univ.)

In chaos control proposed until today, the target system is known in many cases. However, since the generating mechanism of chaos is not strange in few case, it is required to control only by the time series data observed from the system. Then, as the method of stabilizing the state of the unknown system, we propose the technique made combining PFC and DFC using a parameter which indicates the balance of both methods. The prediction values at the PFC input portion are determined from the known output using RNN. The input is impressed only near UPO calculated from the output using the concept of UPR.

14:40 – 15:00 **D-FP04-6**

A Study on the Fuzzy Control in the Modeling Equipment of the Height-level of Water by the Personal Computer

Tsunehiro MUNAKATA
(Hiroshima Kokusai Gakuin Univ.)

This paper describes the results on the fuzzy control in the modeling equipment of the height-level of water, in comparison with the results of PID control in the same system. By using two types of the fuzzy control, it is reported that the response rapidity, smoothness and complexity of the fuzzy control are superior to PID control by the experiment results.