

# FE03

## Nonlinear Control III

15:40-17:40

Room : Base 1st Floor-Otztal

Chair1 : Tadashi Ishihara ( Tohoku Univ., Japan )

Chair2 : Yoonsu Nam ( Kangwon Nat'l Univ., Korea )

15:40 – 16:00

FE03-1

### Distinctive point extraction and recognition algorithm for counters for the various kinds of bank notes.

Yong-won Joe, Eung-seop An, Jae-kang Lee, Il-hwan Kim(Kangwon Nat'l Univ., KOREA)

Counters for the various kinds of bank notes require high-speed distinctive point extraction and recognition for notes. In this paper we propose a new point extraction and recognition algorithm for bank notes. For distinctive point extraction we use a coordinate data extraction method from specific parts of a bank note representing the same color. The recognition algorithm uses a back-propagation neural network that has coordinate data input. The proposed algorithm is designed to minimize recognition time.

16:00 – 16:20

FE03-2

### Integral Controller Design for Time-Delay Plants Using a Simplified Predictor

Tadashi Ishihara(Tohoku Univ., JAPAN), Jingwei Wu(NRC Innovation Centre, CANADA)

A new integral controller is proposed for time-delay plants. The proposed controller has Davison type structure and utilizes a simplified state predictor instead of the optimal state predictor for the extended system. The simplified predictor is introduced by a trick similar to that used in the Smith predictor. As a systematic method for designing the proposed controller, the application of the loop transfer recovery (LTR) technique is considered. For the plant input side and the output side, explicit representations of the sensitivity matrices achieved by enforcing the formal LTR procedure using Riccati equations are obtained. A numerical example is presented to compare the asymptotic...

16:20 – 16:40

FE03-3

### A Study of 「Mode Selecting Fuzzy Controller」 for a Dynamic System under Irregular Disturbance

Young-Soo Yoon, Yong-Kwan Kim, Jong-Bok Lee, Won-Seok Choi, Hoon Heo(Korea Univ., KOREA)

- Introduction of fuzzy logic controller for dynamic system under irregular disturbance
- Fuzzy rules by displacement information and the frequency characteristics of the system
- Modal analysis for the frequency informations of the system
- Introduction of mode selecting unit(MSU) based on Fast-Fourier transform(FFT) algorithm
- Piezo ceramic as an actuator of flexible structure

16:40 – 17:00

FE03-4

### Global Stabilization of High-Order Cascade Nonlinear Systems Using Smooth Feedback

Keylan Alimhan, Hiroshi Inaba(Tokyo Denki Univ., JAPAN)

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17:00 – 17:20

FE03-5

### Development of an Automatic Sorting System Driven by Friction Force

min seok ko, jeong wook lee, jung ha kim(Kookmin Univ., KOREA)

Abstract: In this research, we are trying to develop an automatic sorting system, which is mostly affected by frictional forces between a veneer and plank. So we will make a suitable dynamic model and mechanism to control the velocity feedback. We will suggest stick-slip motion model which can predict the stability behavior of this system. The control system has a feedback loop, in which the following operations are included. A kind of sensor can get the velocity of the mass to adhesive veneer. The output of result signal should be passed to a filter, then to a phase shifter, which applies an adjustable phase-shift, to a variable-gain amplifier. A shaker will be attached to the mass, which ex...

17:20 – 17:40

FE03-6

### Active Stick Control using Frictional Torque Compensation

Yoonsu Nam(Kangwon Nat'l Univ., KOREA)

An active stick which has the variable force-feel characteristics is developed. A combined position and force control strategy is mechanized using a 2-axis built-in force sensor and LVDT. The 2-axis force sensor which measures the stick force felt by the operator is developed by using strain gages and appropriate instrumental amplifiers. A mathematical model of the active stick dynamics is derived, and compared with the experimental results. The frictional torque of the stick due to the mechanical contacts of several parts makes the experimental frequency responses to be dependent on the magnitude of excitation signal, and the precision closed loop control to be difficult. A friction observe...