TE03

Adaptive and Robust

15:40-17:40 — **Chair1 : Jongkol Ngamwiwit** (King Mongkut's Institute of Technology Ladkrabang, Thailand)

Room : Base 1st Floor-Otztal — **Chair2 : Kazutoshi Araki (Kumamoto Univ., Japan)**

15:40 – 16:00 **TE03-1**

Strengthening Robustness within the Boundary Layer by Incorporating Adaptive Control

Gee-yong Park, Ji-sup Yoon, Byung-suk Park, Dong-hee Hong, Young-hwan Kim(KAERI, KOREA)

The method of endowing the controller with the strengthened robustness within the boundary layer is presented for controlling the uncertain nonlinear systems in which the variations of the uncertainties are slow. From this controller, the width of the boundary layer where the robust control input is smoothened out can be given by an appropriate value but a better control performance within the boundary layer can be achieved without the control chattering because the role of adaptive control is to compensate for the uncovered portions of the robust control occurred from the continuous approximation within the boundary layer.

16:00 – 16:20 **TE03-2**

Integrated sliding mode and adaptive control of nonlinear systems with guaranteed tracking performances

Ji-Hong Li(KRISO, KOREA), Sang-Jeong Lee(Chungnam Nat'l Univ., KOREA)

This paper presents an integrated sliding mode adaptive control scheme for general nonlinear uncertain systems, where structured uncertainty is assumed can be linearly parameterized and unstructured uncertainty is assumed be bounded by unknown constant. A certain estimation scheme for this unknown constant is introduced to attenuate the unstructured uncertainty. Presented control scheme is shown to be stable and numerical expressions of bounds of all error signals are given, from which we can acquire some useful information about practical trade-off between tracking performance and parameter estimation property.

16:20 – 16:40 **TE03-3**

State Feedback Control by Adaptive Observer for Plants with Unknown Disturbance

Kazutoshi Araki, Ryuji Michino, Ikuro Mizumoto, Zenta Iwai(Kumamoto Univ., JAPAN), Tomoya Makino(FUJITSU LIMITED)

1) Linear state feedback control design problem for plant with unknown deterministic disturbance is considered and a method to realize state feedback by using adaptive observer which estimates the unknown disturbance simultaneously is proposed.
2) From the viewpoint of practical application, we propose an extended adaptive observer with direct plant path from input to output, which is necessary to use the acceleration type sensors as plant output.
3) Theoretical result is confirmed by numerical simulation of 1-DOF vibration control system.

16:40 – 17:00 **TE03-4**

Active Vibration Control based on Simple Adaptive Control

Kazutoshi Araki, Ryuichi Kohzawa, Ikuro Mizumoto, Makoto Kumon, Zenta Iwai(Kumamoto Univ., JAPAN)

1) A method to realize active vibration control using SAC and acceleration type sensor is proposed from the viewpoint of practical application.
2) The use of acceleration type sensor makes it easy to satisfy ASPR condition in applying SAC system and to implement sensor in practical mechanical system.
3) Results were confirmed through numerical simulation of 1-DOF vibration system.

17:00 – 17:20 **TE03-5**

Position Control of Overhead Crane System by Neural Network Based Self-Tuning Control

Arnut Burananda, Jongkol Ngamwiwit, Sumit Panaudomsup, Taworn Benjanarasuth(KMITL, THAILAND), Noriyuki Komine(Tokai Univ., JAPAN)

- Contents 1 Introduction
- Contents 2 Crane Description
- Contents 3 Self-tuning Controller Design
- Contents 4 Result of Experiments
- Contents 5 Conclusions
- Contents 6 References

17:20 – 17:40 **TE03-6**

Control Methodology of Inverse Response Process

Tontirittiphol Pratch, Kumwachara Kiattisak, Janchookiat Mongkol(KMITL, THAILAND)

In this paper, each methodology, e.g. normal single PID controller, direct synthesis method and inverse response compensator, will be compared to determine the best inverse response plant control method, by based on the appearance of the control performance and robustness from the simulation results. The flexibility of being able to maintain the system stability during the presence of plant model mismatch is one of the criteria to measure the robustness of overall control system. Once, plant has changed the condition, the model will need to be updated. Hence, the designed controller will not work properly. The caused of plant model mismatch is stayed by definition unknown but the most possib...