# TP07

# Identification I

**13:30-15:30**
**Room : 1st Floor-Seefeld**

**Chair1 : Tae-Woong Yoon ( Korea Univ., Korea )**
**Chair2 :**

**13:30 – 13:50** **TP07-1**

### Fuzzy Supervisory Sliding Mode Controller/Observer Based Control of an Inverted Cart Pendulum

SeungJin Kim, Suk-Kyo Hong(Ajou Univ., KOREA)

- Introduction
- Takagi-Sugeno Fuzzy Model and Sliding Mode Controller
- Observer and Controller Design
- Simulations
- References

**13:50 – 14:10** **TP07-2**

### Discrete-time robust Kalman filter design in indefinite inner product space

Tae Hoon Lee, Jin Bae Park(Younsei Univ., KOREA), Tae Sung Yoon(Changwon Nat'l Univ., KOREA), Won-Sang Ra(ADD, KOREA)

- Uncertainties are described by sum quadratic constraint(SQC)
- SQC is converted into an indefinite quadratic cost function
- A Kalman filter developed in indefinite inner product space is Krein space Kalman filter
- To minimize the SQC, the Krein space Kalman filter is used
- The proposed robust filter outperforms the standard Kalman filter and existing robust Kalman filter
- The proposed filter has the same recursive, simple structure as the standard Kalman filter
- Easy to design, adequate for on-line implementation

**14:10 – 14:30** **TP07-3**

### Speed and Flux Estimation for an Induction Motor

Gil-Su Lee, Dong-Hyun Lee, Tae-Woong Yoon(Korea Univ., KOREA), Kyo-Beum Lee, Ick Choy(KIST, KOREA), Joong-Ho Song(Tech. Seoul Nat'l Univ., KOREA)

- In this paper, a new method of estimating the rotor speed and flux is proposed.
- The stator currents and voltages are measurable and all the system parameters are known.
- There are a number of common terms in the error dynamics.
- This is utilized to find a simpler error model involving some auxiliary variables.
- Using this error model, the state estimation problem is converted into a parameter estimation prob.
- Some stability properties are given on the basis of Lyapunov analysis.
- The effectiveness of the proposed scheme is demonstrated through simulations and experiments.

**14:30 – 14:50** **TP07-4**

### Dynamic Electrical Impedance Tomography with IMM Scheme

Suk In Kang, Bong Seok Kim, Min Chan Kim, Sin Kim, Yoon Joon Lee, Kyung Youn Kim(Cheju Nat'l Univ., KOREA)

In EIT, an array of disjoint electrodes is attached on the boundary of the object and a set of small alternating electrical currents is injected into the object through these electrodes, and then the corresponding set of voltages is measured on the same array of the electrodes. The objective in EIT is to estimate the resistivity distribution inside the object based on the set of measured voltages and injected currents. In this paper, we proposed a new dynamic EIT reconstruction scheme based on the interacting multiple model (IMM) algorithm. The main contribution of the proposed scheme is that multiple models are employed for the state evolution to get around the modeling uncertainty. Extensi...

**14:50 – 15:10** **TP07-5**

### Quasi-Deadbeat Minimax Estimation for Deterministic Generic Linear Models

Kwan Ho Lee, Soo Hee Han, Wook Hyun Kwon(Seoul Nat'l Univ., KOREA)

In this paper, a quasi-deadbeat minimax estimation (QME) is proposed as a new class of time-domain parameter estimations for deterministic generic linear models. Linearity, quasi-deadbeat property, FIR structure, and independency of the initial parameter information will be required in advance, in addition to a new performance criterion of a worst case gain between the disturbances and the current estimation error. The proposed QME is obtained in a closed form by directly solving an optimization problem. The QME is represented in both a batch form and an iterative form. A fast algorithm for the suggested estimation is also presented, which is remarkable in view ...

**15:10 – 15:30** **TP07-6**

### A Novel Parametric Identification Method Using a Dynamic Encoding Algorithm for Searches (DEAS)

Jong-Wook Kim, Sang Woo Kim(POSTECH, KOREA)

In this paper, a novel optimization algorithm which searches for the local minima of a given cost function is proposed using the familiar property of a binary string, and is applied to the parametric identification of a continuous-time state equation by the estimation of system parameters as well as initial state values. A simple electrical circuit serves as an example, whose precise identification results show the superiority of the proposed algorithm.