# D-FE06

## Aerospace- Control 2

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**15:20 – 15:40**  **D-FE06-1**

### The Study of Gain Scheduled PD-like Fuzzy Logic Control : Application to High Maneuverable Aircraft

Hong Sung-Kyung and Lee Jung-Young
(Sejong-Lockheed Martin Aerospace Research Center )

This paper describes an approach for synthesizing a modularized gain scheduled PD type fuzzy logic controller(FLC) for a high maneuverable aircraft system, where the gains of FLC are on-line adapted according to the flight condition. Specially, the systematic procedure via root locus technique is carried out for the sellection of the gains of FLC. Simulation results demonstrate that the proposed gain scheduled fuzzy logic controller yields better control performance than the normal ( without gain scheduling ) fuzzy controller

**15:40 – 16:00**  **D-FE06-2**

### Biased PNG for Approximate Target Adaptive Guidance

Song chanho, Kim philsung and Jun byungeul
(ADD)

An approximate target adaptive guidance algorithm(TAG) is proposed on the basis of the assumption that angular acceleration of missile to target line-of-sight and start time for TAG can be obtained by IR seeker. The algorithm does not use any target state estimator. Instead, it avoids the problem of determining target attitude by using the observation that the missile using LOS rate guidance is nearly on the collision course in the later point of engagement. Computer simulation results show that the proposed algorithm can effectively perform target adaptive guidance.

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**16:00 – 16:20**  **D-FE06-3**

### Design of the Autopilot Algorithm for Unmanned Aerial Vehicle (UAV) & Its Flight Test

Hong Sung-Kyung and Wee Jung-Hyun
(Sejong-Lockheed Martin Aerospace Research Center)

Since 1990's, there has been many researches for the development of the Unmanned Aerial Vehicle (UAV). Especially, for the development of digital electronics, the technologies of UAV toward to the miniaturization low-cost, and high reliability. Therefore, recent trends for the development of UAV are focused on the development modern Flight Control System (FCS). In this paper, focusing on the FCS, the development process for Sejong Unmanned Research Vehicle -1 (SURV-1) from design to flight test is presented.

**16:20 – 16:40**  **D-FE06-4**

### Real-time Aircraft Parameter Estimation using LWR

Song Yongkyu
(Hankuk Aviation Univ.)

In this paper the Local Weighted Regression (LWR) technique is applied to the estimation of aircrcraft parameters. The method consists in improving the Local Weighted Regression (LWR) technique by adding a data Retention-and-Deletion (RD) strategy. The improvement comes with reduced computational effort since the two techniques can share their main computational procedures. The purpose of the study was to establish if the proposed algorithm could provide fast and reliable real-time estimations, with accuracy comparable to other well-known off-line identification schemes. The algorithm was tested using specific parameter estimation maneuvers and flight data of the NASA F/A-18 HARV. The results were compared with both the estimation obtained from ...

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**16:40 – 17:00**  **D-FE06-5**

### Error Analysis of the Navigation System Integrating Attitude GPS and low-Cost INS

Lee Jae Ho , Seo Hungserk , Sung Tae Kyung , Lee Sang Jeong
(Chungnam National Univ.)

An attitude GPS receiver with 3 antennas obtains 3-dimensional attitude using GPS carrier phase measurement. INS obtains the 3 dimensional navigation solution for IMU consisting of accelerometers and gyro. Ground-alignment process for the low -cost INS cannot be performed well due to the large sensor noise. Using the standard GPS receiver, however, continuous in-flight alignment for the INS becomes possible, and consequently, the errors in IMU sensors and navigation solution can be compensated. Especially with attitude measurement from the attitude GPS receiver, the compensation of errors in gyroscope and attitude would be done respite of the vehicle's dynamics and their error covariance would be reduced. This paper presents ...

**17:00 – 17:20**  **D-FE06-6**

### Accelerometer Mixed Algorithm Using Fuzzy Technique

Jin Yong, Cho SungYun and Park Chan Gook
(Kwangwoon University)

This paper presents the attitude algorithm using Fuzzy technique to mix gyro information with accelerometer. The attitude angle calculated by the low-cost gyros only increases its error with time rapidly because of the integration process of the algorithm and large sensor error. It is known that the accelerometer output includes the attitude information of a vehicle and its information is more effective during low dynamic maneuver. Therefore it is needed to combine two information appropriately for obtaining the attitude information from low-cost MEMS inertial sensors. Because Fuzzy logic is very effective to make a decision of maneuvering state, it is applied to the mixed algorithm. It is shown by experiment ...