# D-TA07 Aerospace Technology 1

**08:30-10:30** **Chair : Lho Young-Hwan (Woosong Univ.)**
**Room : 4232** **Co-Chair : Shim Kyu-Min (Agency for Defense Development)**

**08:30 – 08:50** **D-TA07-1**

### In-Flight Alignment Algorithm Using Uplinked Radar Data Including Time Delay

Park Chan Ju, Kim Heun Beik and Song Gi Won
(Agency for Defense Development)

Initial attitude error is one of the large error sources in the navigation errors of SDINS. And it is important to decide the initial attitude of SDINS. The method, like a self-alignment or a transfer alignment method, is required to a precise INS. If we do not have a precise INS, we should get large attitude error. After performing the initial alignment, a vehicle has the initial attitude error. Therefore, it results in navigation error due to the initial attitude error. But, if we use position imformation during flight, we could esitmate and compensate a vehicle attitude error. So, we can maintain a precise attitude inspite of existing the initial attitude error. Using the uplinked position information from a land-based radar system, the new algorithm estimates the attitude of the SDINS during flight...

**08:50 – 09:10** **D-TA07-2**

### Minimum Sensing Angular Velocity Improvement of Ring Laser Gyro Using a Low-Scattering Mirror

Jo Min-Sik, Shim Kyu-Min, Kim Hoe-Young, Cho Hyun Ju
(Agency for Defense Development)
Jun Gab Song, Son Seong-Hyun(IAE)

For the improvement of minimum sensing angular velocity of ring laser gyro, the influence of a low-scattering mirror application to laser resonator was investigated. Super-polishing technique was employed for the fine mirror substrates of less than 1-Å-rms roughness. Mirror coating using ion-beam sputtering coating machine produced low-scattering mirror less than 30-ppm scattering. As a result of the mirror application to ring laser, the minimum sensing angular velocity of the gyro was improved down to about 0.1 deg/sec.

**09:10 – 09:30** **D-TA07-3**

### A Study on The Jump Error Smoothing Scheme by Fuzzy Logic

LEE Tae-Gyoo and KIM Kwangjin
(Agency for Defense Development)

This study describes the jump error smoothing scheme with fuzzy logic based on the scalar adaptive filter. The scalar adaptive filter is an useful algorithm for smoothing abrupt jump errors. However, the performances of scalar adaptive algorithm depend on the variance of real signal. So to design an effective algorithm, many informations of real and jump signal are required. In this paper, the fuzzy rules are designed by the analysis of scalar adaptive filter, and then the improved and simplified scheme is developed for smoothing the jump error. Simulations to INS/GPS integrated system show that the proposed method is effective.

**09:30 – 09:50** **D-TA07-4**

### Performance Analysis on GPS RAIM in the Post SA Era

Choi Jae Won, Lee Jang Gyu(Seoul National Univ.)
Park Chan Gook(Kwangwoon Univ.)
Jee Gyu-In and(Kunkook Univ.)

Using GPS in the navigation systems such as aviation, maritime and land applications, integrity is considered importantly with accuracy for safety. Integrity monitoring performed in the GPS receiver itself is Receiver Autonomous Integrity Monitoring (RAIM) and need not an independent ground monitoring station. RAIM algorithm uses redundant information when more than four satellites are visible and makes consistency checks between measurement information to alarm users whether the system is operating out of its specified performance limits. Selective Availability (SA) that was used to protect the security interests of the U.S. and its allies by globally denying the full accuracy of the civil system was turned off on May 1, 2000. ...

**09:50 – 10:10** **D-TA07-5**

### A Study on The Attitude Stabilization Techniques of Leo Satellites

Lho Young Hwan and Jung Kang Yong
(Woosong Univ.)

In the three axis control of satellite by using reacion wheel and gyro, a reaction wheel produces the control torque by the wheel speed or momentum, and a gyro carries out measuring of the attitude angle and the attitude angular velocity. In this study, dynamic modelling of the Low Earth Orbit (LEO) is cosisted of the one from the rotational motion of the satellite with the basic rigid body and a flexible body model, and the gyro in addition to the reaction wheel model. The results obtained by the robust controller are compared with those of the PI (Proportional and Integration) controller which is commonly used for the stabilizing satellite.

**10:10 – 10:30** **D-TA07-6**

### A Study on Flight Data Analysis & Animation System Development

Kim JaeHyung and Shin SungSik
(Korean Air)

The FDAS(Flight Data Analysis & Animation System) is a comprehensive analysis system designed for the improvement of flight safety. FDAS provides decoding, analysis and animation tools that can be used for investigation of data origination primarily from Flight Data Recoders(FDRs), Quick Access Recoders(QARs), Using FOQA(Flight Operation Quality Assurance) Data Analysis, an analyst can perform a variety of functions including data smoothing, interpolation, differentiation, integration, calculator function, flight path generation, performance routines, as well as user-programmed functions. Utilizing data captured and processed by our FDAS software module, FDAS provides high-fidelity 3-D aircraft views and instruments views. Multiple windows enable you to view the situation from a variety of perspectives, including out-of-window, chase plane ...