Guidance Navigation & Control 1

09:00-11:00  Chair : Ochi Yoshimasa (National Defense Academy)
Room : C202  Co-Chair : Bang Hyo Choong (KAIST)

09:00 – 09:20  Stationkeeping of an Airship
Chang-Su Park, Hyo-Choong Bang, Min-Jea Tahk
(KAIST)
The airship is starting to receive new highlights as a stable floating platform. A floating platform can serve as a telecommunication relay station or an environmental outpost. Much of these operations require unmanned autonomous operation on the airship. Due to difficulties in modeling and identifying the airship, controlling the airship is not an easy task. Different from the normal aircraft, the airship is affected by "added mass" and buoyancy. The added mass is the additional mass felt required to move the object in a fluid. As we are searching for a stable floating platform, controlling the airship to keep station is critical. We use a simple airship model with added mass for simulation. Classical controller is used to find acceptable airship performances.

09:40 – 10:00  Longitudinal Flight Control of a Transport Aircraft Using Thrust Only
Y. Ochi and K. Kanai
(National Defense Academy)
This paper deals with a problem of decreasing the airspeed and the altitude of a transport aircraft using thrust only. Such a situation can occur, if the aircraft loses all hydraulic power that drives the control surfaces. A controller for flight path angle control is designed using the model following servo control method, which is a PI-type optimal regulator. For computer simulation, a simulation model that covers a range of flight envelope is made using given linear models and trim points at some flight conditions. Nondimensional aerodynamic coefficients, derivatives and trim points that are not at the given trim points are computed by linear interpolation. The model is effective in simulation where the trim point varies. Simulation using …

Kanta Imai, Yuzo Shimada, and Kenji Uchiyama
(Nihon Univ.)
In this report, an adaptive flight control law based on a linear-parameter-varying (LPV) model is presented for a flight control system. The control system is designed to track an output of a vehicle to a reference signal from the guidance system, which generates a reference flight path. The proposed adaptive control law adjusts the controller gains continuously on line as flight conditions change. The obtained adaptive controller guarantees global stability over a wide flight envelope. Computer simulation involving six-degree-of-freedom nonlinear flight dynamics is applied to Japan's automatic landing flight experimental vehicle (ALFLEX) to examine the effectiveness of the proposed adaptive flight control law.