Flight Control Design with Variant Factor and Recursive Control Approaches

The flight control design for fixed-wing aircraft is conducted with the variant factor (VF) and recursive control (RC) approaches based on the hierarchical dynamic inversion (HDI). The main idea of HDI is to partition a system into a number of subsystems to which the dynamic inversion based techniques are easily applicable. The VF approach is applicable to control design of a class of affine nonlinear systems with input saturation. The RC approach is applicable to control design of a class of non-affine nonlinear systems. The time-scale skill is adopted to select the feedback gains/ gain matrices of the subsystems appropriately so that the stability of the resulting closed-loop system is guaranteed. The simulation results show that the flight control laws designed at a nominal flight condition are applicable to full of the subsonic flight envelope and the resulting closed-loop system can achieve better performances than that designed with the linear quadratic regulator.