

Aircraft Pitch Attitude Control Using Backstepping

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Abstract : A nonlinear approach to the automatic pitch attitude control problem for aircraft transportation is presented. A nonlinear model describing the longitudinal equations of motion in strict feedback form is derived. Backstepping is utilized for the construction of a globally stabilizing controller with a number of free design parameters. The controller is evaluated using the aircraft transportation. The adaptation scheme proposed allowed us to design an explicit controller with a minimal knowledge of the aircraft aerodynamics. Finally, the simulation results will show that backstepping controller have better dynamic performance, simpler design, higher precision, easier implement, etc. At the same time, the control effect will be significantly improved. In addition, backstepping control is superior in short transition, good stability, anti-disturbance and good control.

Keywords : nonlinear control, backstepping, aircraft control, Lyapunov function, longitudinal model

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