

Airplane Stability during Climb/Descend Phase Using a Flight Dynamics Simulation

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Abstract : The stability of the flight during maneuvering and in response to probable perturbations is one of the most essential features of an aircraft that should be analyzed and designed for. In this study, we derived the non-linear governing equations of aircraft dynamics during the climb/descend phase and simulated a model aircraft. The corresponding force and moment dimensionless coefficients of the model and their variations with elevator angle and other relevant aerodynamic parameters were measured experimentally. The short-period mode and phugoid mode response were simulated by solving the governing equations numerically and then compared with the desired stability parameters for the particular level, category, and class of the aircraft model. To meet the target stability, a controller was designed and used. This resulted in significant improvement in the stability parameters of the flight.

Keywords : flight stability, phugoid mode, short period mode, climb phase, damping coefficient

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