State Space Model of an Aircraft Using Simulink

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Abstract: **In aircraft designing it is crucial to understand and evaluate the behavior, performance, safety and other aspects of the systems before its operational testing. To develop a robust control system of an aircraft it is therefore necessary to have a good mathematical model of the system so that the behavior can be easily understood, predicted and controlled. In this paper the state space model of an autopilot aircraft is formulated using Simulink Matlab Function files. The proposed simulation model can be used to gain knowledge in order to make decisions at all development stages. In this paper the model has some assumptions such as the aircraft is taken in steady cruise at constant altitude and velocity, balancing the thrust, drag, weight and lift forces in X and Y direction, secondly change in pitch angle will not change the speed of the aircraft under any circumstances and lastly he input will be the elevation differential θ_d and the output will be the pitch angle θ_p of the aircraft. We have worked only on stability axis and emphasized on the fast settling of the system without significant overshoots. The state space model using Simulink is successfully formulated and simulated with and without controller. The angle of aircraft, pitch rate and pitch angle are selected as state variables.In addition to this the stability analysis from the state space model is also performed and improved using PD controller.**