Mathematical Representation, Modeling and Linearization for Fixed Wing UAV

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Abstract

The UAV is an acronym for Unmanned Aerial Vehicle, which is an aircraft without pilot on board. UAVs can be remote controlled by a pilot at a ground control station or can fly autonomously base on pre-programmed flight plans or more complex dynamic automation systems. Technology advancements have enabled the development of it to do many excellent jobs as reconnaissance, surveillance, battle fighters, and communications relays. Simulating an unmanned aerial vehicle (UAV) dynamics and analyzing its behavior at the preflight stage is too important and more efficient. In this paper, shows a mathematical modeling of the aircraft and derivation full non-linear equations of motion on modeling technique (Ultrastick-25e) and then the linearized airframe transfer function is derived in longitudinal and lateral plane via two synthesis, Jacobin and analytical manipulation from the derived equation of motion.

And show the validation of analytical linearization transfer function with Jacobin and nonlinear model in each lateral and longitudinal channel.
References


Index Terms

Computer Science

Information Sciences

Keywords

Mathematical modeling; Equations of motion; analytical and Jacobin linearization; modeling; nonlinear model; validation; UAV