EVALUATION of RECURSIVE METHODS FOR AIRCRAFT PARAMETER ESTIMATION

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Abstract

Recursive parameter estimation consists of extracting aerodynamic stability and control derivatives using the flight measured input/output data in a real-time mode. It is useful in applications such as on-board verification of recorded data, iterative experiment design, verification of flight control laws, and reconfiguration of control system following damages. Three recursive algorithms, namely the Recursive Least Squares (RLS), Extended Kalman Filter (EKF) and Discrete Fourier Transform (DFT) are formulated and a comparative study has been carried out in the off-line environment using simulated and flight data for longitudinal and lateral-directional modes of aircraft motion. The results from the standard iterative Output Error Method (OEM) form the basis for evaluating the performance of these recursive methods. All the recursive methods discussed in this document gave results matching with those from OEM. The overall performance of DFT method was found to be better than that of the RLS and EKF methods. Also, DFT is computationally simpler and unlike the other two methods, there is no requirement of any tuning parameter. From this aspect, the DFT technique seems to be preferable for online identification purposes.

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