FLIGHT TESTS OF A TWIN-ENGINE AIRCRAFT: PERFORMANCES, STABILITY AND PARAMETER ESTIMATION

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Abstract. *The present paper deals with flight test activities performed on P2006T twin-engine light aircraft recently designed and produced by Tecnam(www.tecnam.com). Research activities and flight tests have been performed during the flight certification (C.S. 23) of P2006 aircraft. All the acquired data and flight results presented have been focused to both aircraft certification and to measure and optimize aircraft performances and flight qualities. All flight data have been acquired through a light, accurate and reliable flight instrumentation available at DIAS(Department of Aerospace Engineering). The first part of the paper deals with flight tests that have been performed to measure and acquire aircraft flight performances. Some flight data about aircraft levelled speed, stall speed, climb characteristics and ground performances (take-off and landing) will be presented. After preliminary flight tests, winglet have been designed and added to the final configuration to obtain good climb performances also in OEI(One Engine Inoperative) condition. Excellent ground performances have been measured with short take-off and landing distances compared to aircraft belonging to the same category. All measured flight performances can be considered very good for this aircraft category and have been used to demonstrate aircraft safety and to obtain C.S. 23 certification. The second part of the paper deals with flight test activities that have been performed to obtain a quantitative measurement of aircraft flight qualities (i.e. dynamic longitudinal stability characteristics) and to perform a complete aircraft parameter estimation. Through a dedicated set of performed manoeuvres and consequent acquired flight data the longitudinal stability derivatives have been estimated through MLM (maximum likelihood method). A matlab code with the longitudinal equation of motion and with classical aircraft dynamics equations has been used to reconstruct the aircraft aerodynamic model.*