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Preliminary Development of an Onboard Weight and Balance Estimator for Commercial Aircraft

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Abstract

A novel approach to onboard in-flight weight and balance estimation systems is presented. Data from an Airbus A320 fleet from an airline were used to assess the feasibility of the approach. Simple flight mechanics in combination with statistics allowed for the identification of weight and center of gravity position using cruise angle of attack, Mach number and elevator deflection values. The good agreement between the theoretical model and the obtained values for the lift curve slope as a function of Mach as well as the standard error of the estimate for center of gravity position and cruise flying weight indicate that the method is sound. The major implication of this work is that the development of onboard and in-flight weight and balance systems can be significantly simpler than previous literature suggested. The impact of this paper could be immediate for airlines since all the tools required to implement the system as described are readily available. This could have an effect in operating costs, safety and environment.

Keywords: Weight and Balance, Estimators, Onboard, In-flight, Airlines

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