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FIVE-HOLE PROBE CALIBRATION FROM DYNAMIC AND TOWER FLYBY MANEUVERS

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Abstract

This paper describes the flight test and data analysis techniques applied to calibrate the static pressure measured by the pitot static systems and the flow angles measured by a five-hole probe mounted on a noseboom. Dynamic maneuvers with rapid variations in the aircraft motion are analyzed applying modern parameter estimation techniques based on the output error method to calibrate the angle of attack and angle of sideslip. A complementary approach based on the Kalman Filter technique is applied to wind-box maneuver to calibrate the flow variables. The tower fly-by maneuvers are analyzed using the classical approach of altitude determination through geometrical evaluation of photos; and accurate information is derived from redundant sources to calibrate the pitot static system. The investigations showed that the static pressure measured by aircraft installed pitot static system is accurate enough whereas that measured by an additional sensor mounted on the noseboom required speed dependent correction. The flight estimated sensitivity factors for the flow angles measured by the five-hole probe agreed reasonably well with the manufacturer's specifications subject to corrections for biases resulting from misalignment and time delays caused by the recording equipment.

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