

Calibration of an Experimental Six Component Wind Tunnel Block Balance Using Optical Fibre Sensors

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Abstract

In order to meet the increasingly stringent requirements for wind tunnel balances, as expressed by the wind tunnel testing community, balance design philosophy needs to be further expanded to include alternative sensor, material, design and manufacturing technologies. These are required to not only improve performance, but also to reduce production costs and lead times. This paper outlines the design and evaluation of a six component block balance that uses Optical Fibre Bragg Grating (OFBG) sensors. The six component block balance uses the “two-groove” optical fibre method of strain measurement. The two-groove method offers a simplified balance design with enhanced sensitivity, and/or higher stiffness, as well as low component interactions and total electromagnetic interference (EMI) immunity. The conceptual balance design was analyzed using the finite element method, and a prototype was manufactured. A major design driver was the minimization of component interactions.