

Design and development 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 conceptual design 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 concept. The two-groove optical fibre concept 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 FEM. A major design driver was the minimization of component interactions. All but two of the component interactions were below 0.5% of their full scale output values