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SmartX Morphing Wing:

Deflection Monitoring in the Wind Tunnel using Optical Fibre Sensors

Abstract

This work highlights the smart fibre optic sensing methodology developed and incorporated in the *SmartX-Alpha* morphing wing demonstrator. The sensing technology developed here uses a method of incorporating both hybrid interferometry and FBG spectral sensing. This is achieved using a standard single-core optical fibre. The objective of this method is to be able to estimate the deflections of the morphing modules of the wing using the least amount of grating sensors. Apart from the lab environment, the tests were carried out in the wind tunnel to replicate real flight conditions. This was carried out with a focus on bending and torsional deformations of the morphing modules. The method is shown to achieve good accuracy for deflection sensing and to provide vital information for wing load monitoring purposes.

