



Код: 10846

W. Hillger, A. Szewieczek, D. Schmidt

Damage Detection in a Helicopter Composite Tailboom by Mode Conversion of Lamb Waves

Дрезден, Германия, 2012 год

8 стр; формат: 23,5 x 16 см; библиографический список: 6 единиц

Lamb waves (LWs) can be easily excited and received by piezoelectric patches, are able to propagate over large distances and interact with defects. Therefore these waves are attractive for active Structural Health Monitoring (SHM) systems. DLR-FA was involved in the EU project AISHA II. The research was focussed on impact detection in a helicopter EC 135 tailboom. This complex honeycomb sandwich component with a length of about 3.5 m is totally different from "laboratory specimens" because of an asymmetric construction with skins of GFRP and CFRP and several copper mash foils for flash protection. First investigations show that LWs with frequencies below 30 kHz propagate through the whole thickness what is important for impact detection. The classic method with a network of switched piezoelectric patches used as sensors and actuators failed for damage detection. For analysing the wave interaction with defects a visualisation of the wave field using air-coupled ultrasonic technique has been developed. This visualisation showed mode conversions from S_0 to A_0 at all stiffness changes: core bondings, impacts and even at glued piezoelectric sensors. The more glued sensors the more complex the wave field is. Based on these results a concept of damage detection in the tailboom has been developed. This concept uses mode conversion as an indicator for damages. In order to have a minimal additional distortion of the wave propagation only few actuators are applied on the structure at positions with "natural" mode conversions. The 64 sensors are air-coupled and arranged in eight arrays with multiplexers. This paper presents details about the wave propagation, the demonstrator system, and shows first results of damage detection.

Доклад. 6-я Европейская конференция по мониторингу технического состояния сооружений, 2012. Редакция Кристиана Боллера.

Ключевые слова:

Содержание

Abstract
Introduction
Lamb wave investigations
New concept for damage detection
Hardware and software for a demonstrator
Results
Conclusion
Acknowledgement