M. Scheerer, D. Lager, M. Marischler, F. Graf, A. Peldszus

Damage Detection Capabilities of Ultrasonic Phased Arrays and Sparse Arrays in Metallic and Composite Structures

Дрезден, Германия, 2012 год

Код: 10753

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

In order to be able to inspect large areas of composite structures an ultrasonic SHM System based on Piezo-Actuators and Piezo-Sensors was developed where 8 actuators and 8 sensors are used to monitor 1 m2 of a composite structure. Two different configurations were evaluated: a phased array configuration where the actuators and sensor were placed close to each other and a sparse array configuration where the actuators and sensors were spread over the area to be monitored. In both concepts each actuator was actuated by a burst signal confined in time and frequency and all sensors were used to capture the response of the structure before and after introduction of different damages. A delay and sum post processing algorithm where the difference between the individual signals before and after damage introduction were used as input was used to visualize the damaged region. The used algorithm also allows the compensation of environmental effects such as temperature. A lab based SHM system consisting of the piezo actuators and sensors, the actuation hardware and the control and data acquisition unit was set-up. The system and the post processing algorithm was tested on several panels made of Al and CFRP with different types of damages - holes and impact damages - between 300 and 800 mm2 of overall size and both configurations - phased and sparse array - were compared regarding its damage detection, localization and quantification abilities.

Ключевые слова:

Содержание.
Abstract
Introduction
Description of the system components
Results of validation tests
Summary
Acknowledgement