



Код: 10318

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Advanced Approach for Multi-Site Damage Monitoring on Aircraft Fuselage Panel Using Sparse PZT Actuator/Sensor Arrays

Издательство DEStech Publications, Lancaster, 2011 год

8 стр; формат: 23,5 x 16 см; библиографический список: 4 единицы
ISBN: 978-1-60595-053-2

The paper deals with an approach to automated in-situ monitoring of corrosion damage on Aluminum alloy aircraft fuselage panel. In order to monitor the panel, an array of sparsely distributed PZT actuators/sensors is used. The sensor array is designed to enclose the whole investigated area, whose health status is interrogated by means of generation and registration of ultrasonic guided waves.

The status of the monitored area is visualized by a fast and robust algorithm called WEMAT. The algorithm produces an image map representing spatial distribution of a damage index using signal difference coefficients (SDC), which are calculated using correlation analysis of baseline and actual sensor response. The SDCs are further used by an advance signal processing based on Principle Component Analysis. The aim of the processing is to achieve automated and robust indication, localization and estimation of size of multiple defects, which can emerge in the monitored area. The algorithm is capable of reliable detection of very small defect located in vicinity of relatively large defect. The designed approach was tested on a fuselage panel specimen. Testing results are presented in the paper.

Ключевые слова:

Содержание.

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