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Structural Monitoring and Damage Detection on CFRP Specimens by Using Broadband Acousto Ultrasonic and Electromechanical Impedance Measures

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In order to be environment-friendly the military and civil aircraft industry is aimed to design airplanes with low weight as much as possible. The most appropriated material for achieving this aim is carbon fiber reinforced plastic (CFRP). Another very important point by aircraft design is the reliability of the designed aircrafts. The main failures of CFRP are fiber cracks as well as delamination of inner coat which are not visible on the plane skin. Damage inspections of the airplane body are very expensive and take long investigation time, involved with corresponded down time. Thus an inspection system is needed, which can monitor CFRP parts and estimate the remaining lifetime of them. In this work two suitable measurement methods for the characterization of the structure are investigated, the broadband acousto ultrasonic (AU-BB) and the electromechanical impedance (EMI). Both of them are realized with small piezoceramic patches which were mounted to the surface of the CFRP specimens. Two different test setups were used for the investigations. The experimental results show, that both measurement methods are deployable for e.g. local damage detection in a structure health monitoring (SHM) system. The applied signal processing algorithms could be implemented with considerably small hardware effort to realize a compact SHM system.

Ключевые слова:

Содержание.

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