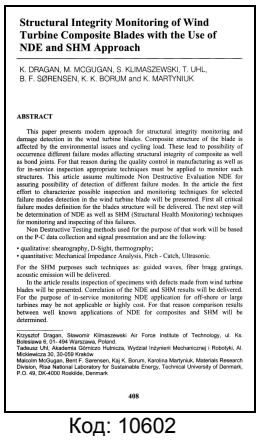

Structural Integrity Monitoring of Wind Turbine Composite Blades with the Use of NDE and SHM Approach

K. DRAGAN, M. MCGUGAN, S. KLIMASZEWSKI, T. UHL, B. F. SØRENSEN, K. K. BORUM and K. MARTYNIUK

ABSTRACT

This paper presents modern approach for structural integrity monitoring and damage detection in the wind turbine blades. Composite structure of the blade is affected by the environmental issues and cycling load. These lead to possibility of occurrence different failure modes affecting structural integrity of composite as well as bond joints. For that reason during the quality control in manufacturing as well as for in-service inspection appropriate techniques must be applied to monitor such structures. This article assume multimode Non Destructive Evaluation NDE for assuring possibility of detection of different failure modes. In the article the first effort to characterize possible inspection and monitoring techniques for selected failure modes detection in the wind turbine blade will be presented. First all critical failure modes definition for the blades structure will be delivered. The next step will be determination of NDE as well as SHM (Structural Health Monitoring) techniques for monitoring and inspecting of this failures.

Non Destructive Testing methods used for the purpose of that work will be based on the P-C data collection and signal presentation and are the following:

- qualitative: shearography, D-Sight, thermography;
- quantitative: Mechanical Impedance Analysis, Pitch - Catch, Ultrasonic.

For the SHM purposes such techniques as: guided waves, fiber bragg gratings, acoustic emission will be delivered.

In the article results inspection of specimens with defects made from wind turbine blades will be presented. Correlation of the NDE and SHM results will be delivered. For the purpose of in-service monitoring NDE application for off-shore or large turbines may be not applicable or highly cost. For that reason comparison results between well known applications of NDE for composites and SHM will be determined.

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Ключевые слова:

Содержание.