

DETECTION OF LOCAL BONDING FAILURE DAMAGE BY DIGITAL IMAGE CORRELATION TECHNIQUE

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ABSTRACT

Detectability of the bonding failure damage for GFRP(Glass-Fiber Reinforced Plastic) composite under the in-plane and out-of-plane loads was investigated through the 3-dimensional DIC(Digital Image Correlation) strain and deflection measurement. The damage was introduced to the tensile specimen and trailing edge of 100 kW wind turbine blade which were subject to in-plane and out-of-plane load, respectively. DIC measurement was performed over the tensile specimen surface and the blade surface, including the damage, with a 3D DIC system(ARAMIS 5M). The longitudinal and transverse strain profiles for the in-plane tensile specimen were determined, and the deflection profile and deflection, longitudinal and chordwise strain profile for the wind turbine blade were obtained. From these measurements, it was found that the dissimilarities, like local concentration and gradient, in the directional strain profiles were corresponded to the presence of the damage. Therefore, the bonding failure damages in the tensile specimen and wind turbine blade could be detected from the deflection and directional strain profile. Beside, in this study, sensitivity of these profiles to the applied loads was examined to determine an optimal load level for DIC measurement.