

Detection of Defects in CFRP by Ultrasonic IR Thermographic Method

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Abstract : In the paper introduced the diagnostic technique making possible the research of internal structures in composite materials reinforced fibres using in different applications. The main reason of damages in structures of these materials is the changing distribution of load in constructions in the lifetime. Appearing defect is largely complicated because of the appearance of disturbing of continuity of reinforced fibres, binder cracks and loss of fibres adhesiveness from binders. Defect in composite materials is usually more complicated than in metals. At present, infrared thermography is the most effective method in non-destructive testing composite. One of IR thermography methods used in non-destructive evaluation is vibrothermography. The vibrothermography is not a new non-destructive method, but the new solution in this test is use ultrasonic waves to thermal stimulation of materials. In this paper, both modelling and experimental results which illustrate the advantages and limitations of ultrasonic IR thermography in inspecting composite materials will be presented. The ThermoSon computer program for computing 3D dynamic temperature distributions in anisotropic layered solids with subsurface defects subject to ultrasonic stimulation was used to optimise heating parameters in the detection of subsurface defects in composite materials. The program allows for the analysis of transient heat conduction and ultrasonic wave propagation phenomena in solids. The experiments at MIAT were fulfilled by means of FLIR SC 7600 IR camera. Ultrasonic stimulation was performed with the frequency from 15 kHz to 30 kHz with maximum power up to 2 kW.

Keywords : composite material, ultrasonic, infrared thermography, non-destructive testing

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