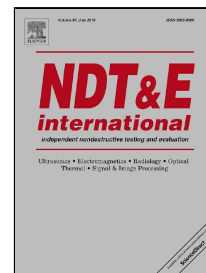


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Evaluation of Interlaminar Delaminations in Titanium-Graphite Fibre Metal Laminates by Infrared NDT techniques.

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Keywords

Layered materials, Fibre Metal Laminates, Debond, Infrared Thermography, Laser.

Abstract

10 Fibre Metal Laminates (FMLs) describe a number of aerospace-grade layered structural materials where thin metal alloy foils are interleaved with Fibre Reinforced Polymer (FRP) plies. Such material hybridisation at the layer meso-scale poses a challenge for non-destructive testing (NDT). On the other hand, the need for NDT inspection of FMLs arises due to the potential development of interlayers disbonds, both during fabrication or in-service. This work describes the successful
15 implementation of two Infrared-NDT approaches to evaluate a defected FML panel made of Titanium/Graphite (Ti-Gr). One technique is based on the modulation of the deployed heat from a low-cost halogen lamp, to retrieve defects as phase-contrast signatures from harmonics in the frequency domain. The second technique uses a flying laser heat-source, raster scanning the surface, searching for defect signatures on the heat distribution trail of the moving laser. The work explores
20 also the opportunity to collimate the laser heat source as a round spot or a linear distribution. The proposed non-conventional IR-NDT approaches are also compared with a well-established Pulsed Phase Thermography (PPT) algorithm, demonstrating a similar ability of defects evaluation, but offering some favourable features, which are highlighted in the work.

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