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Optical excitation thermography for twill/plain weaves and stitched fabric dry carbon fibre preform inspection

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Abstract

Carbon fibres have become the natural choice as reinforcements for polymer composite materials (PMCs). The non-destructive inspection of dry carbon fibre preforms has the potential to increase the reproducibility and reduce the cost of PMC manufacturing, by identifying defects in dry multilayer preforms prior to resin injection. However, use of optical excitation thermography for inspecting dry carbon fibre preforms that constitute the structural reinforcement precursor in the manufacturing of PMCs is poorly documented in the open literature. In this work, optical excitation thermography was used for inspecting six dry multilayer carbon fibre preforms featuring different textile structures, thicknesses and defects, for the first time. Advanced image processing techniques were used in processing the thermographic data for comparative purposes. In particular, partial least square thermography, as a recently proposed technique, was studied in detail. Finally, the performance of different thermog-

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