COMPUTERIZED TOMOGRAPHY CHARACTERIZATION OF LOW VELOCITY IMPACT DAMAGE IN GLASS FIBER REINFORCED POLYESTER COMPOSITE

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ABSTRACT

The purpose of the present study is to characterize matrix crack and delamination propagation occurrences in a glass fiber reinforced polyester matrix composite after low velocity impact loading. A computerized tomography (CT) imaging procedure was performed in order to obtain cross-sectional and 3-dimensional (3D) images of impacted composite samples. Further, to visualize the localized low velocity impact damage volumes; based on the specimens CT results; image analysis, geometric modeling and meshing software were used. Finally, interpretation of damage mechanisms occurred in glass fiber reinforced polyester matrix composite after low velocity impact loading presented with accurate 3D rendered models obtained from a series of CT slices. Rendered 3D models help to quantify the internal microscopic damage modes. Results showed that matrix cracking, fiber breakage and impact damage cone formations are directly affected by the magnitude of the impact energy. Visualizing internal damages with CT appears to be an effective method.

Key Words: Computerized Tomography, Composite materials, Low velocity impact loading, 3 dimensional model, Microscopic damage modes.