

The Effect of Nylon and Kevlar Stitching on the Mode I Fracture of Carbon/Epoxy Composites

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Abstract : Composite materials are widely used in aviation industry due to their superior properties; however, they are susceptible to delamination. Through-thickness stitching is one of the techniques to alleviate delamination. Kevlar is one of the most common stitching materials; in contrast, it is expensive and presents stitching fabrication challenges. Therefore, this study compares the performance of Kevlar with an inexpensive and easy-to-use nylon fiber in stitching to alleviate delamination. Three laminates of unidirectional carbon fiber-epoxy composites were manufactured using vacuum assisted resin transfer molding process. One panel was stitched with Kevlar, one with nylon, and one unstitched. Mode I interlaminar fracture tests were carried out on specimens from the three composite laminates, and the results were compared. Fractographic analysis using optical and scanning electron microscope were conducted to reveal the differences between stitching with Kevlar and nylon on the internal microstructure of the composite with respect to the interlaminar fracture toughness values.

Keywords : carbon, delamination, Kevlar, mode I, nylon, stitching

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