Durability Study of Low Velocity Impact Responses of Conventional and Nanophased CFRP Composites Exposed to Seawater

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The effect of nanoclay on the degradation of low velocity impact responses of both conventional and 2 wt% infused carbon/epoxy (CFRP) composites manufactured by the vacuum assisted resin transfer molding (VARTM) process is experimentally investigated with and without exposure to seawater for marine applications. Nanoclay was dispersed into matrix by using magnetic stirring. Samples (100 mm by 100 mm) exposed to seawater for 0, 6, and 12 months in laboratory conditions were impacted at 20, 30, and 40 J energy levels using Dynatup8210. The damage was evaluated by C-scan. Comparison between conventional and nanophased CFRP composites both in conditioned and unconditioned cases were made in terms of peak force, absorbed energy, deflection, delamination area, and specific delamination energy. Water absorption was observed to be reduced due to nanoclay infusion. Impact strength, toughness, and energy absorption decreased with increasing conditioning time by weakening the bond between the fiber and matrix and softening the matrix materials. However, reduction in properties is significantly extenuated by the incorporation of nanoclay in the matrix. It is concluded that excellent barrier capacity and higher surface area of nanoclay is responsible for the superior performance of CFRC composites, which in turn enhances the durability of composites.