

Effect of Cryogenic Treatment on Hybrid Natural Fiber Reinforced Polymer Composites

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Abstract : Natural fibers as reinforcement in polymer matrix material are gaining lot of attention in recent years. Natural fibers like jute, sisal, coir, hemp, banana etc. have attracted substantial importance as a potential structural material because of its attractive features along with its good mechanical properties. Cryogenic applications of natural fiber reinforced polymer composites are gaining importance. These materials need to possess good mechanical and physical properties at cryogenic temperatures to meet the high requirements by the cryogenic engineering applications. The objective of this work is to investigate the mechanical behavior of hybrid hemp/jute fibers reinforced epoxy composite material at liquid nitrogen temperature. Hybrid hemp/jute fibers reinforced polymer composite is prepared by hand lay-up method and test specimens are cut according to ASTM standards. These test specimens are dipped in liquid nitrogen for different time durations. The tensile properties, flexural properties and impact strength of the specimen are tested immediately after the specimens are removed from liquid nitrogen container. The experimental results indicate that the cryogenic treatment of the polymer composite has a significant effect on the mechanical properties of this material. The tensile properties and flexural properties of the hybrid hemp/jute fibers epoxy composite at liquid nitrogen temperature is higher than at room temperature. The impact strength of the material decreased after subjecting it to liquid nitrogen temperature.

Keywords : liquid nitrogen temperature, polymer composite, tensile properties, flexural properties

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