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FIRST PLY FAILURE ANALYSIS IN HYBRID COMPOSITE MATERIAL SISAL/E-GLASS FIBER REINFORCED EPOXY RESIN FOR SYMMETRIC LAMINATE

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ABSTRACT

The characteristics of combination of sisal fiber, glass fiber and epoxy resin are exemplary to predict their strength. They depend on fiber content, its length, amalgamation of both different fibers which means Biofiber-synthetic Fiber composite. Sisal/E-glass fiber reinforced epoxy resin are provided with improved mechanical properties because of addition of glass fiber to the natural fiber. Mostly natural fibers when reinforced with artificial fiber composites, it becomes enticing due to light weight, high strength, ecofriendly and also taking into consideration of its environmental safety. Sisal fiber and glass fibers are combined in same matrix to form hybrid composites using Epoxy resin. The objective of the paper is to analyse the strength of each layer of hybrid composite material sisal/E-glass fiber reinforced epoxy for symmetric laminate which consists of 8 layers. If there is low strength ratio in one layer, maximum load is calculated to that layer. The strength ratio for all the plies/layers in the laminate are done using the maximum strain and Tsai –Wu failure theories. Considering the strength ratio, maximum load applied is calculated to determine the laminate safe using First Ply Failure (FPF) analysis method. First Ply Failure analysis (FPF) is a method to predict the strength of laminate. Conclusively, the results for on axis stress and strain are calculated, then strength ratio of each layer is greater than 1 which means all 8 layers are safe. Minimal value of strength ratio lets say $SR_2 = 1.81$, the maximum load calculated are σ_{xmax} ***= 27.15 MPa,*** $\sigma_{ymax} = 54.3$ MPa and $\tau_{xymax} = 18.1$ MPa are obtained. The above natural fiber reinforced with glass fibers are now extensively used in automobile and marine industries, etc.

Keywords: Hybrid composite material sisal/glass reinforced epoxy resin. First Ply Failure analysis. Maximum load. Stren

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