

Partial replacement of glass fiber by woven kenaf in hybrid composites and its effect on monotonic and fatigue properties

ABSTRACT

Natural–synthetic fiber hybrid composites offer a combination of high mechanical properties from the synthetic fibers and the advantages of renewable fibers to produce a material with highly specific and determined properties. In this study, plain-woven kenaf/glass reinforced unsaturated polyester (UP) hybrid composites were fabricated using the hand lay-up method with a cold hydraulic press in a sandwich-configuration laminate. The glass was used as a shell with kenaf as a core, with an approximate total fiber content of 40%. Three glass/kenaf weight ratios percentages of (70/30)% (H1), (55/45)% (H2), and (30/70)% (H3) were used to fabricate hybrid composites. Also pure glass/UP and kenaf/UP were fabricated for comparison purposes. Monotonic tests, namely tensile, compression, and flexural strengths of the composites, were performed. The morphological properties of tensile and compression failure of kenaf and hybrid composites were studied. In addition, uniaxial tensile fatigue life of hybrid composites were conducted and evaluated. The results revealed that the hybrid composite (H1) offered a good balance and the best static properties, but in tensile fatigue loading (H3) displayed low fatigue sensitivity when compared with the other hybrid composites.

Keyword: Woven roving glass; Woven kenaf; Natural fibers; Hybrid composites; Mechanical properties; Fatigue life assessment