Notch sensitivity of jute fiber mat reinforced unsaturated polyester matrix composites

E. A. Elbadry, M. S. Aly-Hassan, and H. Hamada

Abstract:

The main objective of this research is to study the effect of notch on the tensile strength and characteristic distance of Jute fiber mat reinforced unsaturated polyester matrix composites. These composites were fabricated by modifying the hand lay-up technique with resin pre-impregnation into the jute mats in the vacuum with 32 wt% fiber weight content. For this purpose, circular notch with diameter 10.2 mm was drilled at the specimen center with different widths. Therefore, the effect of the different ratios of the notch size to the specimen width (D/w) with three different values (0.34, 0.44, 0.59) on the characteristic distance (d0) and on the ratio of notched to unnotched strength (σN/σo) based on the net and the gross area was investigated. The characteristic distance d0 is a material property independent of laminate geometry and stress distribution and represents the distance over which the material must be critically stressed in order to find a sufficient flaw size to initiate failure. The results show that as D/w increases, d0 decreases and it is much lower for which based on the net-section than those based on the gross-section. As a result of that, the tensile strength of the jute composites based on the net-section is insensitive to the notch, while it is very sensitive to the notch based on the gross-section compared to the tensile strength of unnotched composites. As expected, σN/σo based on the net-section was higher than that based on the gross area and σN/σo based on the gross area decreases significantly with increasing D/w due to the stress-concentration ahead of the notch.

Keywords:

Jute mat; Unsaturated polyester; Processing; Composites; Tensile strength; Characteristics distance.

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