

Mode-I Toughness and Curing Pressure Characteristic of Symmetrical Lay-Up of Plain-Weave Woven GFRP Composites

Abstract

This study describes an experimental study on the interlaminar Mode-I fracture toughness behavior of hand lay-up plain-weave woven GFRP laminate by using a fracture energy method of evaluation. Mode-I Double Cantilever Beam (DCB) tests were performed on woven GFRP unsaturated polyester composite, E-Glass EWR 600 NISER, specimens. The specimen design and test procedure are performed with reference to the BS ISO 15024 and ASTM D5528. Various curing uniform pressure distribution has been investigated at 35.8, 70.1, 104 and 138.2 kg m⁻², with respect to the toughness value. The lay-up laminates designed with symmetrical arrangement at the center-plane of the composite are also investigated. The experimental results of mode-I fracture toughness as a function of crack length has been obtained. Experimental data obtain are analyzed using the modified beam theory, MBT method. The delamination-resistance curve or the R-curve effect has been found as the general characteristics of the laminate system. Fiber bridging phenomenon with slow and stable crack propagation and extensive half-arm fiber bridged are also observed with lower curing pressure found to produce higher GIC propagation values.