The Stress-Based Model and The Energy-Based Model in Ultra High Polyethylene Fiber Reinforced Thermoset Polymer Composites

Fulltext

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Abstract

The characteristic of adhesion at the interface between polyethylene fiber and thermoset matrix composites could be studied by Kell-Tyson stress-based model [2] and Nairn energy-based model [3,4] including thermal stress and friction effect, which was more realistic than stress-based model as seen in the energy release rate of polyester-polyethlene fiber (38.273 J/m2) which was more shrinkage than epoxy where the energy release rate for epoxy-polyethylene fiber (34.952 J/m2), while the interfacial shear srength for polyester-polyethylene (0.77 MPa) less than interfacial shear strength for epoxy-polyethylene fiber (0.811 MPa). The ultra high pollyethylene fiber molecule is inert and non-polar in nature, and thus chemical bonding with an adhesive is poor so the main adhesion was for thermal stress, which also explain that energy release rate was not depend on crack length (embedded length). In friction region the slip-hardening was due to soft surface of ultra high polyethylene fiber in comparison with matrix surface caused fiber surface fiber abrasion.