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Effects of different stress ratios on fatigue crack growth of rice husk fibre-reinforced composite

Absract

Polymers and polymer composites are susceptible to premature failure due to formation of cracks and microcracks throughout their service. Evolution of cracks and microcracks induces catastrophic material failure. Hence, detection/diagnostics, as well as effective repair of cracks and microcracks, is essential to ascertain performance reliability, cost efficiency, and safety for polymer structures. Upon adopting the Paris relation for empirical data, this study incorporated a mathematical model after weighing in cracks initiation and propagation in rice husk (RH) polymer structures, along with the several viable techniques for life prediction and fracture observation. The specimens contained 35% RH fibres and were produced via an injection molding process. Fatigue cracks were evaluated for stresses between 80 and 90% from ultimate tensile strength (UTS) for R = 0.1, 0.3, and 0.5. The outcomes signified that the increment in R value enhanced the growth rate of the crack. Upon elaborating the fracture analysis, this study discusses in detail both fracture mechanics and formation.

Keywords

Crack growth; Fracture; Life prediction; Rice husk/polypropylene