Energy behavior assessment of rice husk fibres reinforced polymer composite

ABSTRACT

Natural fibre composites, possess characteristics that are beneficial towards the environment and ecosystem, completely biodegradable, renewable, offer strength and reliability of the material properties, and enhance economic development because of its ability in replacing synthetic composites. One of them refers to rice husk, which is a non-timber source that is easily available from agricultural wastes. Hence, rice husk fibres were selected as fibre-reinforced composites, while polypropylene as matrices in this research. Rice husk composite (RHC) specimens were produced via injection molding process. The composite composition was fixed at 35% of fibre content. The cycle tests were conducted to obtain cyclic properties by adhering to specifications outlined in ASTM D3479. Servo-hydraulic machines were used for five different stresses with constant amplitudes of $R = 0.1$, $R = 0.3$, and $R = 0.5$ of S75, S80, S85, S90, and S95 to determine the stress effects on energy dissipation and fatigue life of the material. The results indicated that there was increment in energy loss for the increasing fatigue life in every cycle. This shows that with the addition of natural fibres in composites, the material exhibited viscoelastic behaviour, in which energy loss was represented by matrix cracks and broken fibres.

Keyword: Energy; Fatigue failure; Natural fibre; Rice husk