

Fatigue life estimation of kenaf reinforced composite materials by non-destructive techniques

ABSTRACT

In this study, fatigue life of natural fiber reinforced composite materials was predicted due to manufacturing defects fatigue damage modes. Kenaf bast fibers were used to fabricate natural fiber composite materials with epoxy as a binding material. The Kenaf fiber reinforced composites were manufactured using a hand lay-up process. The defects in Kenaf reinforced composite materials were determined by a non-destructive technique using Infrared (IR) thermal imager. The thermography analyses were verified by optical microscope and scanning electron microscope (SEM) investigations. Then, the Mathematical model for estimating fatigue life by IR thermal imaging technique based on damage accumulation model is proposed. This proposed model is named as S-IR thermal imaging fatigue life model. Determinations of fatigue damage has been predicted and it found that it damage has been fixed with the predicting results. S-IR model proposed that 60% kenaf epoxy with thickness 0.3 cm is recommended as the best formulation to fabricate the specimens due to a longer fatigue life recorded and the result obtained from the fatigue cyclic tension test shows that 60% kenaf epoxy with thickness 0.3 cm had the highest fatigue resistance as indicated by a highest range of stress level, 119.71-53.20 MPa.

Keyword: Fatigue life; Natural fiber reinforced composite; Non-destructive technique