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Abstract

Four-point bending static and fatigue experiments were performed on composite sandwich beams with glass fiber reinforced polymer (GFRP) face sheets and Balsa wood cores. Specimens with various span-to-depth ratios were prepared using a vacuum-assisted resin transfer molding process. The results showed that the sandwich beams under both static and fatigue tests failed due to core shear and debonding. The *S–N* curves of sandwich beams were determined using an exponential empirical model. The study showed that to sustain at least one million cycles, the service load should be limited to 60% of the ultimate load. The deflection evolution of the sandwich beams were found to occur in three stages, namely, transient fall, stable evolution, and rapid failure. Furthermore, a fatigue damage model closely related to the possible detection of damage initiation and progression was proposed. The model was proved to be appropriate for describing the fatigue response of GFRP-Balsa sandwich beams.