

Abstract

This paper reports the structural effects of three-dimensional (3-D) angle-interlock woven composite (3DAWC) undergoing three-point bending cyclic loading from experimental and finite element analysis (FEA) approaches. In experiment, the fatigue tests were conducted to measure the bending deflection and to observe the damage morphologies. By the FEA approach, a micro-structural unit-cell model of the 3DAWC was established at the yarn level to simulate the fatigue damage. The stress degradation at the loading condition of constant deformation amplitude was calculated to show the degradation of mechanical properties. In addition, the stress distribution, fatigue damage evolution and critical damage regions were also obtained to qualitatively reveal the structural effects and damage mechanisms of the 3DAWC subjected to three-point bending cyclic loading.