

Abstract

The drop-weight impact behavior of three-dimensional angle-interlock woven glass fiber/unsaturated polyester resin composites was investigated with a drop-weight impact tester (Instron Dynatup 9250 impact tester). A unit cell model based on the maximum stress failure criterion and critical damage area failure theory was established to define the material properties and stiffness degradation of the three-dimensional angle-interlock woven composites. A user-defined subroutine vectorized user-material was developed to connect with the commercial finite element analysis package ABAQUS/Explicit. The drop-weight impact damage and impact load-displacement curves were calculated and compared with those in the experimental. Good agreements between the experimental and finite element analysis results proved the validity of the unit cell model and the subroutine vectorized user-material. The unit cell model is expected to be extended for the study of the impact damage of three-dimensional angle-interlock woven composites structures.