

Crushing behaviour of composite square honeycomb structure: a finite element analysis

ABSTRACT

This paper investigates the compression properties of square honeycomb core materials based on glass fibre reinforced plastic. The objective of this project is to determine the failure strength and energy absorption of the square honeycomb structure and compare both crushing behaviours between the experimental and finite element simulations. Control specimen made from GFRP is prepared by using traditional hand lay-up technique and the mechanical properties are determined from the INSTRON Tensile Machine. In this study, the numerical simulation of the square honeycomb structure is analysed with the commercial software. In this simulation, the result obtained for maximum stress is 28.24MPa which is located at node 110451. Besides that, the energy absorption for finite element result and experimental result are 310.86 kJ and 282.17 kJ, respectively. The percentage of error is 9.23% which can be considered a good agreement between numerical simulation and experimental result. Lastly, the crushing behaviour between the finite element model and experimental model is slightly different to each other since the model in simulation is assumed to be the preferred structure, whereas the experimental model is imperfect in the geometric model.

Keyword: Honeycomb square; Crushing behavior; Energy absorption