QUASI-STATIC COMPRESSION OF CARBON FIBRE SQUARE HONEYCOMBS

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The superiority of metallic square honeycomb cores over competing metallic topological designs for uses as structural elements in sandwich panels has been established by research done by Cote et al. (2004) [1].

Composite square honeycomb cores have the potential to achieve much higher specific strengths than those of their metallic counterparts. Carbon fibre honeycomb cores constructed from woven fibre materials have reached peak strengths of over twice that attained by metallic cores. A route for fabricating these core structures has been developed, using a micro-milling technique.

A combined experimental, analytical and numerical modelling study was performed. The compressive response (out of plane) of the honeycombs was measured and the failure modes captured and determined. X-ray tomography has been used to capture the internal structure of the specimens, and hence the failure modes of these structures, Fig. 1. Parameters investigated are the relative density, cell aspect ratio, fibre weave orientation and the number of cells.

FIGURE 1. Sections taken through a carbon fibre honeycomb using x-ray tomography, showing a microbuckle running across the width of the specimen.

References

1. Cote, F.; Deshpande, V.S.; Fleck, N.A.; Evans, A.G.; The out-of-plane compressive behavior of metallic honeycombs. *Materials Science and Engineering A*, vol. **380**, n 1-2, Aug 25, 2004, p 272-280