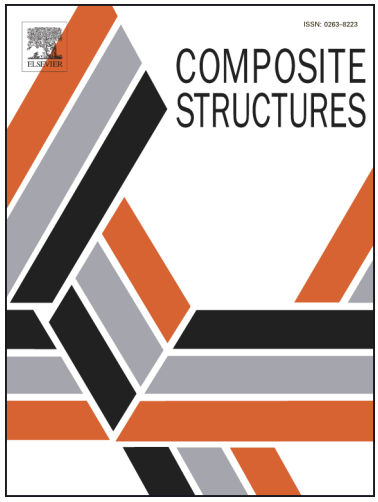

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Yuan Chen, Shujuan Hou, Kunkun Fu, Xu Han, Lin Ye

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Low-velocity impact response of composite sandwich structures: modelling and experiment

Yuan Chen[1,2], Shujuan Hou[1*], Kunkun Fu[2], Xu Han[1], Lin Ye[2†]

[1]State Key Laboratory of Advanced Design and Manufacturing for Vehicle Body, Hunan University, Changsha City 410082, P R China

[2] Centre for Advanced Materials Technology (CAMT), School of Aerospace, Mechanical and Mechatronic Engineering, The University of Sydney, NSW 2006, Australia

Abstract

To predict the damage behaviours of composite sandwich structures with a honeycomb core subjected to low-velocity perforation impact, a numerical model was developed addressing the intra-laminar damage, inter-laminar and adhesive delamination and strain rate effect of the materials. In addition, low-velocity perforation impact was conducted on a carbon fibre epoxy composite sandwich panel with a honeycomb core, and scanning electron microscopy was utilized to assess the damage, in an attempt to validate the simulations from the numerical model. The numerical model can describe the key perforation mechanisms and associated damage patterns, with good predictions on the total energy absorption and the impact force-displacement response of the experiments after taking into account the strain rate effects on the materials. The results showed that the total absorbed energy is 10.6 J in comparison to 11.5 J of the experiment, with an error of -7.8%. Meanwhile, the peak forces are predicted accurately with an error of ~4.2%.

Keywords: Composite sandwich structure; low-velocity impact; modelling; SEM.

* E-mail addresses: shujuanhou@hnu.edu.cn (S. Hou).

† Corresponding author: E-mail address: lin.ye@sydney.edu.au (L. Ye), hanxu@hnu.edu.cn (X. Han).