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International Journal of Recent Technology and Engineering Open Access
Volume 8, Issue 2, July 2019, Pages 2617-2622

The impact behaviour of carbon fiber-epoxy composite leading edge using finite element method (Article) (Open Access)

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Abstract

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Composite material has been widely used in aircrafts due to its high strength to weight ratio that leads to weight saving of the aircrafts. Equally important, aircraft material should be tough i.e. it should have the ability to absorb high energy and thus resist fracture. The aircraft's wing design requires the material to have high toughness as parts of the wing especially its leading edge is subjected to impact loadings. Using finite element software of LS-DYNA, this research focuses on studying the impact behaviour of composite panels that represent the leading edges of wings when the panels are subjected to rigid sphere projectile. Three shapes of panels are used: flat, semi-circular and semi ellipse while panels can be of 2, 4 and 8 layers to vary its thickness. The panels are made of laminated composites with woven carbon fibres and the angle of orientations are [0/90] n, $[0/45]_n$ and $[45/-45]_n$ where n will give the number of layer for the composite. The Mat-58 material type suitable for woven type fibre is used where failure criteria of Hashin is applied. It was found that the simulation results are in a very close agreement with the finding from experiments conducted earlier. Furthermore, the optimum stacking sequence was found to be the $[0/45]_2$ stacking sequences. © BEIESP.

SciVal Topic Prominence

Topic: Laminates | Composite materials | Damage tolerance

Prominence percentile: 98.716

Author keywords

Energy absorption | FEA Simulation | Impact loading | Leading edge

Funding details

Funding sponsor	Funding number	Acronym
Universiti Teknologi Malaysia		
Ministry of Higher Education		MOHE
International Islamic University Malaysia		IIUM

Funding text

The appreciation is given to International Islamic University, Universiti Teknologi Malaysia and Ministry of Higher Education for supporting this research project.

ISSN: 22773878
Source Type: Journal
Original language: English
DOI: 10.35940/ijrte.B3013.078219
Document Type: Article
Publisher: Blue Eyes Intelligence Engineering and Sciences Publication

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