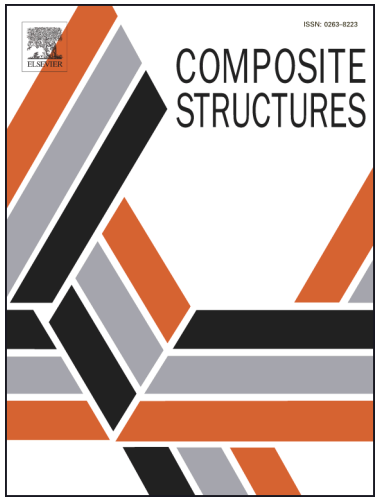

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PII: S0263-8223(18)30960-7
DOI: https://doi.org/10.1016/j.compstruct.2018.07.054
Reference: COST 9972

To appear in: *Composite Structures*

Received Date: 10 March 2018
Revised Date: 13 July 2018
Accepted Date: 16 July 2018

Please cite this article as: Sun, XC., Kawashita, LF., Kaddour, AS., Hiley, MJ., Hallett, SR., Comparison of Low Velocity Impact Modelling Techniques for Thermoplastic and Thermoset Polymer Composites, *Composite Structures* (2018), doi: https://doi.org/10.1016/j.compstruct.2018.07.054

Comparison of Low Velocity Impact Modelling Techniques for Thermoplastic and Thermoset Polymer Composites

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Abstract

This paper presents comparisons between experimental and numerical studies of low-velocity impact damage for thermoplastic (IM7/PEEK) and thermoset (IMS65/MTM) carbon fibre reinforced composites. The experiments were conducted at two key impact energies (8 and 30J) under identical conditions allowing a systematic comparison to be made. Three LS-DYNA Finite Element Analysis (FEA) models (standard, continuum damage mechanics (CDM) and discrete) were implemented, all using cohesive interface elements for delamination. The role of Mode II fracture toughness is highlighted. The predictive capabilities of different modelling techniques are compared and discussed and the CDM model gave better correlation with experiments. Fibre failure was predicted by the numerical approaches. The thermoplastic materials did not show noticeably superior behaviour to the thermoset materials and were governed by unstable delamination damage propagation for the same impact energy.

Keywords: Thermoplastic; Thermoset; Composite; Low-velocity impact; Finite Element Analysis (FEA)

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