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Abstract #XXX

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Corresponding author: Redouane Lombarkia

e-mail of corresponding author: Redouane.lombarkia.1@ulaval.ca

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For student corresponding author: student member of one of the following:

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Title

SPH Technique for enhancing prediction of crash behavior of plain weave fabric composites coupons

Authors

R. Lombarkia^{1}, A. Gakwaya¹*

** Corresponding author*

*¹ Department of Mechanical Engineering, Université Laval, 1065 avenue de la médecine, Québec, Canada,
redouane.lombarkia.1@ulaval.ca*

Abstract

The aim of this work is to combine both meshfree Smoothed Particle Hydrodynamics (SPH) method and FEM Method to carry out crash simulations of plain weave fabric with carbon fibre/epoxy CFRP composites coupons with different layups and trigger type geometries.

A numerical model was developed using the dynamic explicit finite element (FE) structure analysis program Abaqus/Explicit. The CFRP plies were modelled with C3D8R solid elements; interfaces between plies were modeled with Abaqus cohesive contact, whilst SPH particles were positioned for the trigger region for well represent fragmentation in crash front zone.

We demonstrate the efficiency and the advantages of combined FEM/SPH Method to well capture crash damage mechanisms compared to pure FEM approach. Validation with experimental results confirms the ability of this strategy to predict crash behavior of plain weave fabric CFRP composites.