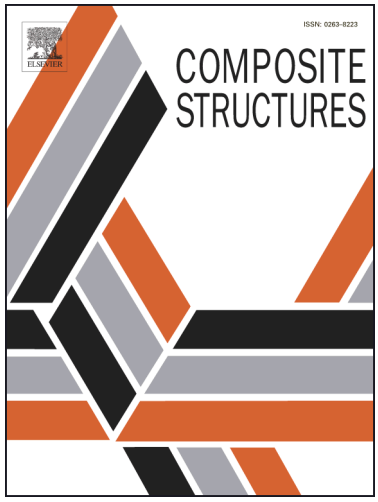

Rate-dependent mode I delamination in ballistic composites – Experiment and simulation

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PII: S0263-8223(17)30391-4
DOI: http://dx.doi.org/10.1016/j.compstruct.2017.08.045
Reference: COST 8803

To appear in: *Composite Structures*

Received Date: 3 February 2017
Revised Date: 13 July 2017
Accepted Date: 10 August 2017

Please cite this article as: May, M., Lässig, T., Rate-dependent mode I delamination in ballistic composites – Experiment and simulation, *Composite Structures* (2017), doi: http://dx.doi.org/10.1016/j.compstruct.2017.08.045

Rate-dependent mode I delamination in ballistic composites – Experiment and simulation.

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Abstract

The mode I fracture toughness of Dyneema® HB26 was experimentally measured for three different loading rates. The experiments showed an apparent increase of fracture toughness with increasing loading rate. Based on this information, and available information on the through-thickness strength, a cohesive zone model was developed incorporating both, rate-dependent mode I strength as well as rate-dependent mode I fracture toughness. The model was implemented into Abaqus/Explicit and used to reproduce the double cantilever beam experiments. A good correlation was found between simulation and experiment. A parameter study revealed new relationships between material parameters and the cohesive zone length. This is an important finding with respect to mesh-size effects, which supports the practicing engineer in selecting appropriate mesh sizes in impact applications.

Keywords: Delamination, Computational Modeling, Mechanical Testing, Strain rate, Dyneema HB26