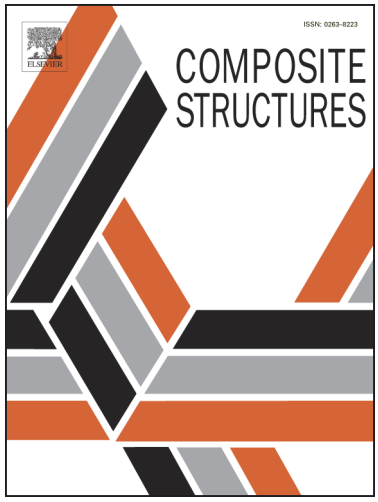


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# Fracture Mechanical Investigations and Cohesive Zone Failure Modelling on Automotive Composites

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**Abstract**

This paper presents the results of fracture mechanical tests on carbon reinforced composites. The evaluation of the experimental data leads directly to material properties for the further application in numerical crash simulations of automotive structures. If fibre bridging was detected within the composite's failure surface, it could be quantitatively considered in the material input data for numerical simulations. The fracture mechanical tests have been conducted at two different velocities differing about several orders of magnitude to account for rate effects. Finally, the paper further presents a first validation of the extracted material models by the application of the identified material cards in numerical simulations.

*Keywords:* carbon reinforced composites, fracture mechanics, mode I, mode II, cohesive zone modelling

## 1. Introduction

In the recent years, carbon reinforced composites are increasingly used not only in aeronautic, but also in automotive industries. A main challenge with respect to the application in automotive structures is the prediction of the failure of a composite in crash load cases.

Cohesive zone models (CZM) represent a method, which is suitable to describe the interlaminar failure within composites. The individual properties

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