

## Accepted Manuscript

Effect of fibre volume fraction and fibre direction on crack paths in flax fibre-reinforced composites

S. Keck, M. Fulland

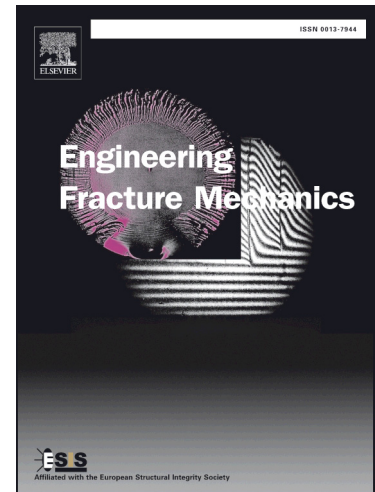
PII: S0013-7944(16)30143-6  
DOI: <http://dx.doi.org/10.1016/j.engfracmech.2016.03.037>  
Reference: EFM 5132

To appear in: *Engineering Fracture Mechanics*

Received Date: 15 December 2015  
Revised Date: 25 February 2016  
Accepted Date: 16 March 2016

Please cite this article as: Keck, S., Fulland, M., Effect of fibre volume fraction and fibre direction on crack paths in flax fibre-reinforced composites, *Engineering Fracture Mechanics* (2016), doi: <http://dx.doi.org/10.1016/j.engfracmech.2016.03.037>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



# Effect of fibre volume fraction and fibre direction on crack paths in flax fibre-reinforced composites

S. Keck\*, M. Fulland

*University of Applied Sciences Zittau/Görlitz, 02753 Zittau, Germany*

---

## Abstract

Mechanical and fracture mechanical behaviour of composites reinforced with unidirectionally aligned flax fibres is investigated experimentally and numerically. Thereby, the main points are the determination of crack paths in compact tension specimens with three different fibre directions under static as well as fatigue loading and their fatigue crack growth rate curves. Due to the pronounced orthotropic behaviour of those materials the crack path is not only governed by the stress state, but affected by the fibre direction and fibre volume fraction as well. Therefore, the well-known stress intensity factor solutions for the standard specimens are not applicable. Consequently, extensive numerical simulations have been carried out to evaluate the stress intensity factor evolution along the growing crack in order to be able to determine fatigue crack growth rate curves. An approach for calculating stress intensity factors analytically with geometry correction factor functions is conducted exemplified for one fibre direction.

*Keywords:* Natural fibre-reinforced composites, Orthotropic material behaviour, Crack paths, Fatigue crack growth rate curves, Numerical simulation

---

---

\*Corresponding author. Tel.: +49-3583-611849; fax: +49-03583-611804  
*Email address:* S.Keck@hszg.de (S. Keck)

Download English Version:

<https://daneshyari.com/en/article/5014237>

Download Persian Version:

<https://daneshyari.com/article/5014237>

[Daneshyari.com](https://daneshyari.com)