Accepted Manuscript

A high resolution method for characterisation of fibre misalignment angles in composites

D. Wilhelmsson, L.E. Asp

PII: S0266-3538(18)30940-0

DOI: 10.1016/j.compscitech.2018.07.002

Reference: CSTE 7288

To appear in: *Composites Science and Technology*

Received Date: 19 April 2018

Accepted Date: 1 July 2018

Please cite this article as: Wilhelmsson D, Asp LE, A high resolution method for characterisation of fibre misalignment angles in composites, *Composites Science and Technology* (2018), doi: 10.1016/j.compscitech.2018.07.002.

A high resolution method for characterisation of fibre misalignment angles in composites

D. Wilhelmsson[a], L.E. Asp[a,*]

[a]*Department of Industrial and Materials Science, Chalmers University of Technology, Hörsalsvägen 7A, SE-41296 Göteborg, Sweden*

Abstract

In this paper a novel method to characterise fibre waviness in composites is presented and assessed. The proposed method is referred to as "high resolution misalignment analysis" (HRMA) and is suitable for measurements with high spatial resolution. The HRMA method measures misalignment angles by tracing individual fibres in detailed micrographs. Here, the method is evaluated using software-generated images with known statistics to mimic real micrographs. Results reveal that the HRMA method provides very accurate measurements on composites with high fibre waviness, outperforming existing methods, whereas it performs on par with existing methods for materials featuring medium fibre waviness. The HRMA method is capable of characterising a 2 cm^2 micrograph with a spatial resolution of 55 μm in approximately 1 minute on a standard laptop computer. The HRMA code and software-generated images are supplied as supplementary material to this paper.

Keywords: A. Carbon Fibres, A. Fabrics/textiles, B. Defects, D. Optical microscropy, Fibre waviness

*Corresponding author

Email addresses: denwil@chalmers.se (D. Wilhelmsson), leif.asp@chalmers.se (L.E. Asp)