

Accepted Manuscript

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PII: S0013-7944(17)30778-6
DOI: <https://doi.org/10.1016/j.engfracmech.2018.01.012>
Reference: EFM 5837

To appear in: *Engineering Fracture Mechanics*

Received Date: 27 July 2017
Revised Date: 12 January 2018
Accepted Date: 18 January 2018

Please cite this article as: Sandino, C., Correa, E., París, F., A study of the influence of a nearby fibre on the interface crack growth under transverse compression in composite materials, *Engineering Fracture Mechanics* (2018), doi: <https://doi.org/10.1016/j.engfracmech.2018.01.012>

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A study of the influence of a nearby fibre on the interface crack growth under transverse compression in composite materials

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Abstract

The influence of an undamaged nearby fibre on the evolution of the interface crack growth, associated with matrix failure under compression, is studied by means of a two-fibre BEM model.

The results reveal that when the nearby fibre is aligned with the position at which the first damage appears (or at 120° from it) an accelerative effect on crack growth initiation (versus the single-fibre case) is detected, whereas for the rest of positions the effect is the opposite. Moreover, when the nearby fibre is positioned approximately perpendicular to the external load direction, the interface crack achieves considerably greater lengths.

Keywords: Debonding; Transverse cracking; Micro-mechanics; Numerical analysis.

Highlights

- Nearby fibre effect on debond growth under transverse compression is studied by BEM
- Nearby fibre position aligned with the first debond accelerates crack growth.
- The nearby fibre effect disappears when the distance between fibres is 7 fibre radius.

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