Numerical modelling of fibre/matrix interface

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PhD students:

- 2013 - ... : Amélie Perrier, « Etude expérimentale et numérique du comportement mécanique de l’interface renfort/matrice dans des éco-composites. »
- 2010-2013 : Davi Vasconcellos, « Comportement en fatigue avant et après impact de composites tissés chanvre/époxy. » (with European Label)

Context:

The numerical modelling of fibre/matrix interface is a crucial step towards the simulation of composite behaviour. In particular, in plant fibre composites, the interface quality is strongly affected by the fact that natural fibres are hydrop Hilic, whereas the polymer matrix is hydrophobic. Moreover, the high variability of natural fibre properties has to be taken into account. The aim of this research topic is to identify key-parameters that control the constitutive law of fibre/matrix interface, and to develop corresponding finite element models. Numerical simulations are performed at different scales, and compared to multi-scale experimental measurements in order to be optimised.

Finite element modelling of single-fibre composite


Numerical simulation at macro-scale

- Development of finite element models to predict behaviour of composite structures, taking into account the material microstructure.
Simulation of woven composite material by using a simplified geometry definition, modelling warp and weft yarns, and by taking into account variability of fibre properties. Application to woven hemp/epoxy composite. Comparison of numerical and experimental damage evolution. Analysis of strain fields with DIC measurements at the weave scale.

Some publications:

J.C. DUPRE\(^1\), F. LAGATTU, \(^1\): *Equipe photomécanique, LMS, Université de Poitiers.*


M. SHEN\(^1\), F. TOUCHARD, G. BEZINE, J. BRILLAUD, \(^1\): *Université de Tianjin, Chine.*


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