Associate Professorship of Computational Mechanics and Professorship of Wood Technology
Deparment of Civil, Geo and Environmental Engineering
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Development of the failure criteria for composites

Setting:

Most of the fibre composites have complex anisotropic mechanical behaviour. They show a brittle failure under some loading conditions, and ductile behaviour under others. Therefore, the correct maximum stress/strain limit needs to be defined to correctly predict failure. Although basic models for prediction of the failure are available in commercial FE-codes, they are only capable to cover simple aspects of the complex materials in 3D. User-defined models are needed to extend the basic models for more complex scenarios.

Your Tasks:

- Find different available failure criteria in commercial FE-codes software.
- Extend an existing anisotropic material model for the failure behavior of composite

Simulations will be performed in LS-DYNA or ABAQUS. The programming of a user-defined material model will be done in FORTRAN. Possible candidates should have basic knowledge on FE modelling and an interest in material models.
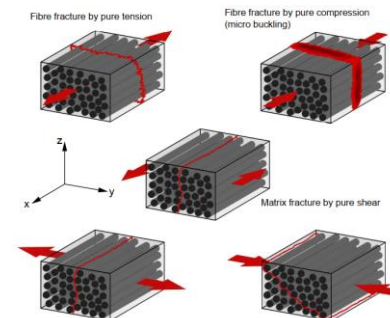
Project Characteristics

Modeling: ★★★★☆
Mathematics: ★★★☆☆
Programming: ★★★★☆
Science: ★★☆☆☆

Filament wound tube before and after impact
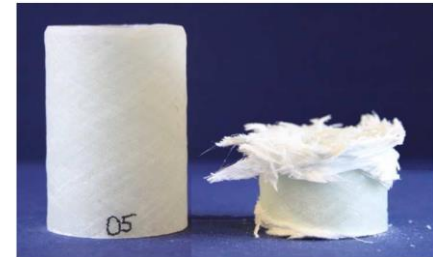
Fracture mode in a single UD-layer

Source: A. Berger, 2014, Numerical Modeling of Composite Materials based on a combined manufacturing crash simulation, PhD, Queen Mary

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