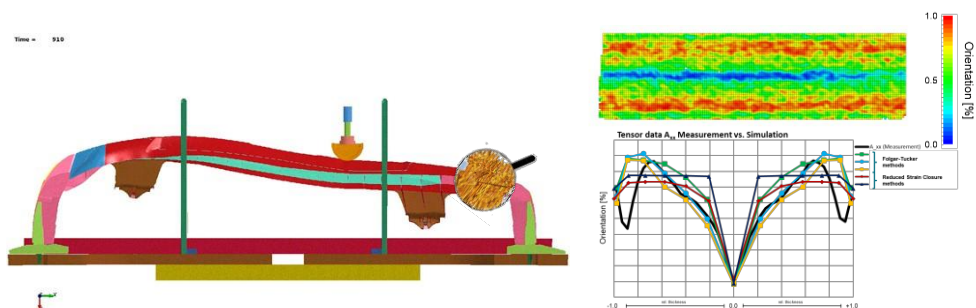


Investigation of homogenization techniques for short fiber reinforced plastics (SFRP) in finite element modeling

Problem description

Modelling of short fiber reinforced plastics (SFRP) is a challenging task, especially taking damage and failure prediction into account. SFRP have an inhomogeneous microstructure, due to large local variations of the fiber orientation and fiber content in the polymer matrix. These characteristics motivate the effects of form filling to be considered in the structural analysis, i.e. in stiffness and crashworthiness applications. The mapping tool Envyo developed by DYNAmore helps users to bridge this gap between process simulation and structural simulation. In such workflows different homogenization schemes can be applied. Focus of the work will be put on parameter identification for advanced constitutive models. Necessary experimental data is available and may be expanded by additional experiments during the thesis. The scope of the thesis work will be adjusted to fit into a six-month time frame and will be carried out at our headquarters in Stuttgart-Vaihingen with support from the DYNAmore Material Competence Center.



Fiber orientation distribution through the thickness of a specimen at an arbitrary position of a component.

Workflow

- Literature review
- Review existing experimental test data and optionally perform further tests
- Training of LS-DYNA, constitutive modeling approaches for SFRP and spatial discretization
- Apply mapping and homogenization methods
- Develop enhancements to consider anisotropic yield and fracture based local fiber orientation

Your profile

- Master student in mechanical, materials or aerospace engineering or comparable studies
- Strong background in mechanics of materials and continuum mechanics
- Knowledge in Finite Element analysis
- Programming skills (C++, Python, Fortran) are an advantage
- Proficiency in MS-Office
- Good oral and written command of the German and English language
- High motivation, flexibility, creativity, ability to work and communicate in a team

Please provide a letter of application with CV, certificates, and transcript of grades.

What we offer

DYNAmore GmbH is a leading software provider for FEM crashworthiness simulation solutions with more than 150 employees from over 13 different countries. We support all major automotive OEMs and Tier 1 suppliers in various offices worldwide.

Contact information

Christian Liebold
Tel: +49 (0) 711 – 459600 – 263
christian.liebold@dynamore.de

Dr. Martin Helbig
Tel: +49 721 608-42073
martin.helbig@kit.edu