IMT Lille Douai
École Mines-Télécom
IMT-Université de Lille

TPCIM
Technologie des Polymères et Composites & Ingénierie Mécanique

Master Internship

«Numerical characterization of sheared organo-sheets based on realistic interpenetration-free geometry»

Context

The work is proposed by Siemens Industry Software NV, which will be directly involved in the daily supervision. This master thesis proposal is a unique opportunity for the material engineering student to be involved simultaneously in academia and industry and to obtain valuable experience in state-of-the-art micro-CT and finite element technology applied to textile composites.

Accurate simulations of a composite part should take into account the manufacturing-induced local variabilities in the composite geometry, which affect the stiffness values locally and, consequently, the mechanical properties of the composite part itself.

The goal of the proposed project is to perform virtual material characterization of thermoplastic woven organo-sheets sheared to various angles and to assess the effect of shear on the homogenized composite elastic properties.

Aims

The project will include the following parts:

- State-of-the-art of the existing textile geometry modelers.
- Perform a benchmarking between available textile software in order to create a realistic interpenetration-free geometry for sheared fabrics.
- Validate results against available microscale Computed Tomography (micro-CT) data using existing tools.
- Extend the current workflow (Figure 1): from voxel-based models towards Computer Aided Design (CAD) with smooth conformal meshes.

Use the VMC ToolKit (from Siemens PLM Software) to compute linear elastic properties and to compare results against existing experimental data.

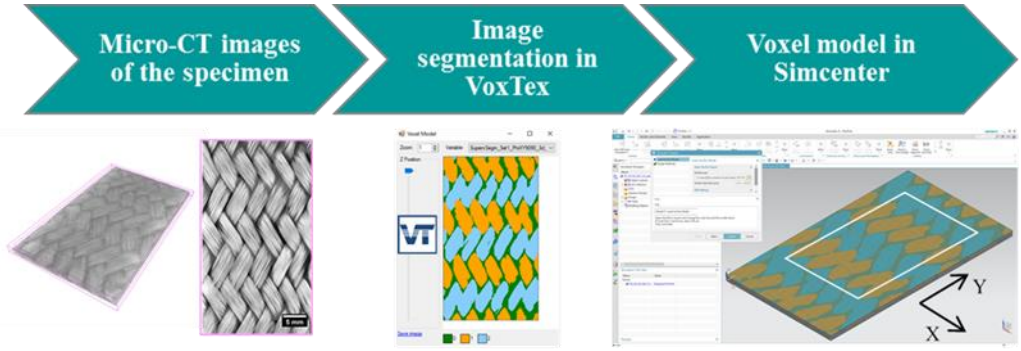

Figure 1 Workflow: from micro-CT images to finite element models

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Conditions :

The internship will be organised between two places of work: the first month and the last month at Polymers and Composites Technology & Mechanical Engineering Department of IMT-Lille-Douai (France) all the rest time at Siemens Industry Software NV Digital Factory Division (Interleuvenlaan 68 3001 Leuven, Belgium). **Free accommodation in Belgium will be provided**.

The internship addresses to master student with strong knowledge of **mechanics and composite materials**. **High level of proficiency in written and spoken English is mandatory**.

The duration of the internship is 6 month. The amount of the gratuity is 577.50€/month (i.e. 3,75 €/h based on 22 working days per month).

Official application must include copy of your curriculum vitae, cover letter and recommendation letter(s).

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