Micro/Meso Scale Modeling of Wedge-Shaped Kink Band Formation in Composites

Master Thesis Project (30 credits/20 weeks – 1 student)

IMS - Material and Computational Mechanics

Project Background

Recent experimental investigations have revealed alternative shapes for kink band formation in unidirectional composites under confined compressive stress. The primary focus of this project is the replication of these different shapes via computational simulation.

High performance composite materials frequently include layers of unidirectional carbon fiber. While carbon fiber epoxy composites have a high specific tensile strength, the compressive strength is typically 30-40% lower. This results in composite designs that are frequently limited by the compressive strength. In order to understand how to improve compressive strength via fiber confinement or other means, the micro and meso mechanics of compressive failure must be understood. The understanding of the dominate micromechanics phenomena that contribute to kink band shape is important step in this progress.


Assignment Description

Selection of an initial material model. 2-D simulation of shear kink band formation. 2-D simulation of wedge-shaped kink band formation. 3-D simulation of shear kink band formation. 3-D simulation of wedge-shaped kink band formation.

Qualifications

Student in their final year of the M.Sc. studies in the field Mechanical or Materials engineering. Preferably with previous experience in Computational Solid Mechanics, specifically knowledge in simulation software such as Abaqus, ANSYS or Nastran is a merit. Furthermore, basic competence within programming is a requirement. It is a plus if the student has an entrepreneurial spirit and is self-driven.

Apply By

Send your resume and cover letter to Brina Blinzler, brina.blinzler@chalmers.se