Seminar im Rahmen des GRK 2078

Referent: **Dipl.-Math. Felix Ospald**
Numerische Mathematik, Fakultät für Mathematik, TU Chemnitz

Datum: Do., 21.07.2016
Uhrzeit: 15:45-17:15 Uhr
Ort: 10.81, HS 62 (R 153)

Titel: **Modeling and Numerical Simulation of Injection Molding for Short Fiber-Reinforced Thermoplastics**

Abstract

In this talk we will present our experience, how to use and extend OpenFOAM's compressible and incompressible two-phase solver for the simulation of injection molding with short fiber reinforced thermoplastics in a laminar flow regime [1]. Second order fiber orientation tensors are computed using the Folgar-Tucker equation (FTE) with exact tensor closure and will be compared to a number of closure approximations. The FTE is coupled to the anisotropic viscosity-term of the Navier-Stokes equations for the non-Newtonian flow in a segregated manner. Phase dependent boundary conditions were implemented to simulate wall heat transfer, stickiness of the melt to the wall and to prevent air-traps close to the wall. Fiber orientations are compared to analytical results for a stationary 2d-channel flow. We also show that OpenFOAM performs simulations for real-world parts efficiently and we discuss its scaling capabilities. Some common issues regarding the evaluation of experimental data (such as viscosity measurements and CT-scans) in means of parameter identification [2] will be covered. Finally we will also give some hints about concentration modeling and associated issues in the semi-concentrated to concentrated regime. The talk closes with some remarks on open problems.

References:

[1] F. Ospald. Numerical simulation of injection molding using OpenFOAM. Proceedings in Applied Mathematics and Mechanics, 14(1):673-674, 2014. doi: 10.1002/pamm.201410320.
[2] Roland Herzog and Felix Ospald. Optimal experimental design for linear elastic model parameter identification of injection molded short fiber-reinforced plastics. International Journal for Numerical Methods in Engineering, 2016. NME-Apr-16-0258.

Alle Interessenten sind herzlich eingeladen.

Prof. Dr.-Ing. Thomas Böhlke