Matti Schneider and Felix Ernesti

Computational Homogenization on Digital Image Data
... on Tour (14.03. - 18.03. 2022)
Microstructured materials

... are a cornerstone of technological progress for increasing energy efficiency.

Computational micromechanics

Motivation:
- Goal: Computing effective material properties on real/realistic microstructures
- Compatible to digital image data (µCT)
- Nonlinear material behavior

Topic of the course:
- Introduction to computational homogenization methods
- Specifically to FFT-based methods (Fast Fourier Transform)
- Discussions on discretization and solution methods
- Elastic and inelastic material behavior
Computational Homogenization on Digital Image Data (Examples of local stresses)

Long-fiber reinforced composite

Sand-grains for casting applications

$512^3 \approx 134 \times 10^6$ elements
Format for winter term 2021/22

- Block course in **March 2022** in **Champs sur Marne** (close to Paris): *Introduction to FFT-based computational homogenization methods for heterogeneous materials*
- Joint workshop with École des Ponts & Mines ParisTech
- Date: Monday – Friday, 14th–18th March 2022
- Oral **exam** at KIT possible
- Workshop financially supported by **DFH**
Lecture and exercise

Lectures given by internationally renowned experts
- Prof. Sébastien Brisard (École des Ponts ParisTech)
- Prof. Francois Willot (Mines ParisTech)
- JProf. Matti Schneider (KIT)

Exercise sessions
- Introduction to Python
- Supported implementation of your own FFT-based micromechanics solver

Exam
- Oral exams in April 2022 at KIT
- The course (6 ECTS) may be taken as
  - Wahlpflichtmodul Maschinenbau
  - SP 30: Angewandte Mechanik
  - G & M des Theoretischen Maschinenbaus
Interested?

- Travel as a group
- Accommodation close to the venue
- Exchange with French students

Interested?

- **20 spots** available
- Sign up until **November 5th, 2021**
- E-Mail to felix.ernesti@kit.edu
- Subject: [Compact Course Computational Homogenization on Digital Image Data]
- Necessary information:
  - Name
  - student number
  - Subject of study & specialization
  - Semester
  - Exam yes/no