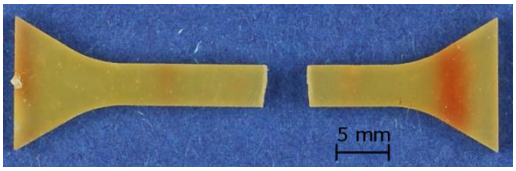
July 2019

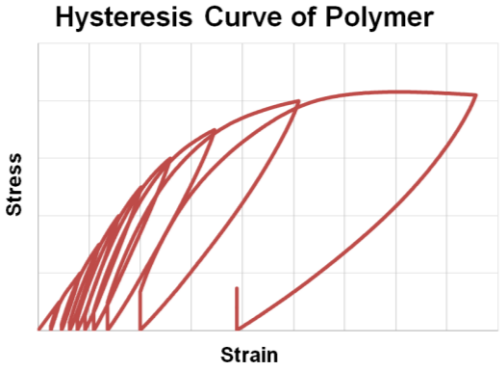
Master Thesis

Parameter Optimization of Material Model FEM Computation

Background

Composite materials such as fiber-reinforced plastics (FRPs) are commonly used in lightweight engineering. The anisotropic mechanical behavior of these materials gives rise to some difficulties concerning the simulation of composites in comparison to metal designs. Due to the complex failure behavior of composite materials, the assessment of composites is a challenging task. In order to efficiently utilize this material, many companies are investing money in the development of new production methods. In order to reduce the development costs of these projects, the expenses for experimental testing have to be lowered. This can only be achieved if the numerical simulation and verification is good enough to predict failure of FRPs accurately. In addition, the more accurately failure can be predicted, the lighter the structure can be designed. Consequently, it is the motivation for researchers all over the world to invest their energy to improve the simulation of fiber-reinforced composites which often involves determination of optimal sets of parameters in order to ensure accurate and functional material model FEM computation to best represent the actual real-life material of assessment.





Your task

- Parameter estimation and optimization strategies for combination of multiple experimental curves of viscoplastic polymer material in FEM simulations
- Literature review on available multivariable optimization algorithms
- Implementation of optimization algorithms in Python for given FEM simulation in Abaqus
- Determination of optimal set of parameters for viscoplastic polymer material model

Requirements

- Background in Mechanical Engineering or similar
- Knowledge in Mechanics and Programming Skills in Python are not necessary but advantageous
- Ability to work independently

What you can expect

- Exposure to the working environment in the research institute/industry
- Skills in analyzing different mechanical experimental data
- Knowledge on parameters optimization to be utilized in mechanical material models

Starting date

Immediately (6 months duration)

Contact

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