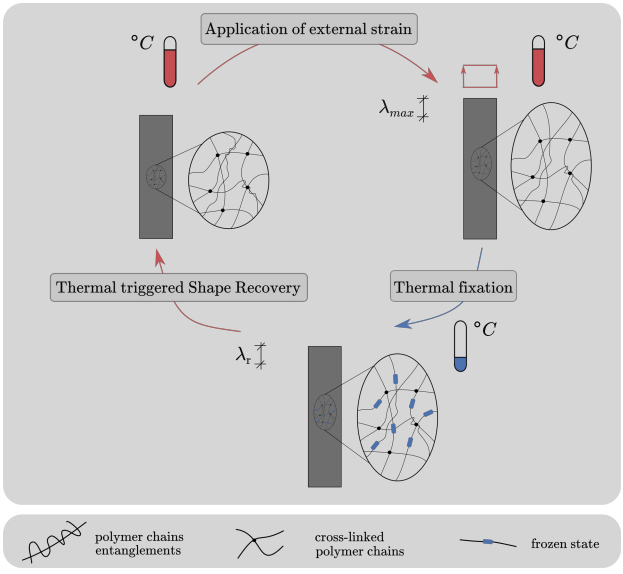
Universität Stuttgart
Institut für Mechanik (Bauwesen)
Lehrstuhl für Kontinuumsmechanik
Prof. Dr.-Ing. H. Steeb

Master thesis

Numerical modelling of humidity and thermal triggered Shape Memory Polymers



The following master thesis is available at the Chair of Continuum Mechanics of the Institute of Mechanics (Civil Engineering).

Shape Memory Polymers (SMPs) have the ability to change shape of geometry due to external influences such as temperature, light or electrical actuation. The shape memory properties can be influenced with humidity.
Therefore, it is of interest in the current scientific research to investigate the humidity dependence of thermal triggered SMP.

In this master thesis, a thermo visco-elastic constitutive model for amorphous SMPs is developed based on the assumption that structural and stress relaxation are the primary molecular mechanisms of the shape memory effect. The described model is then extended to model the effect of absorption of solvent. The model is implemented in the open-source differential equation solver FEniCS.

Tasks:
- Literature Research
- Development of a humidity dependent thermo visco-elastic model
- Implementation and simulation of numerical examples
- Interpretation and discussion of results

Requirements:
- Fundamentals of Continuum Mechanics
- Programming skills in Python

Languages:
- German or English

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