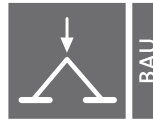


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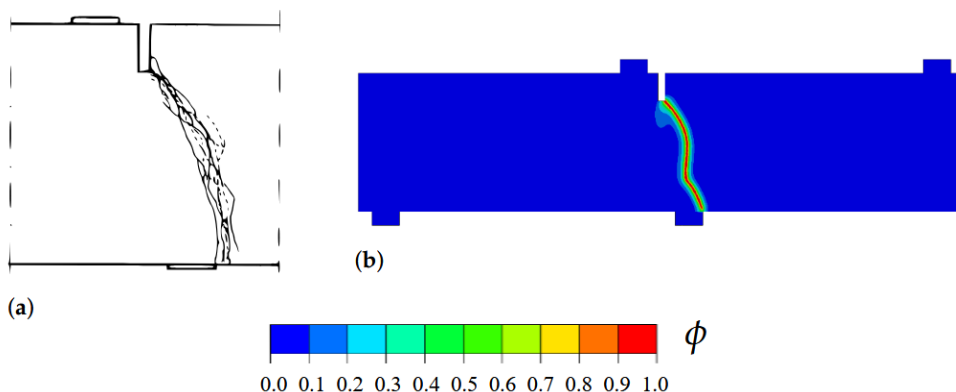
Institut für  
**Mechanik und Statik**

## Bachelor / Project thesis

This work can also be carried out as a **student job (Hiwi)**.

# Comparison of FE phase-field models for fracture

The phase-field is a numerical approach that allows to simulate problems characterized by sharp interfaces. How? By incorporating directly in the formulation a continuous field variable, the phase field itself, which may be regarded as a smooth regularization of multiple physical phases characterizing the system. The Phase field is very appealing and flexible because it is able to capture the interface implicitly without solving a moving boundary problem and therefore it has been successfully applied in the modeling of various engineering problems, including fracture.



Mixed-mode fracture of a concrete beam: (a) Experimental crack patterns, and (b) predicted crack trajectory, as given by the phase field contour [Navidtehrani et al., 2021]

In this thesis, we will provide an in-depth comparison of different FE-based phase-field models analyzing pros and cons of each one, capabilities and limitations. Numerical simulations will be carried out using Abaqus/CAE software.

## Tasks:

- Phase-field literature review
- Getting acquainted with Abaqus/CAE
- Supervised usage of phase-field models within Abaqus/CAE
- Numerical simulations and analysis of the results

## Background knowledge:

- Basics of the Finite element method