Technische Universität Braunschweig

Institut für Akustik und Dynamik

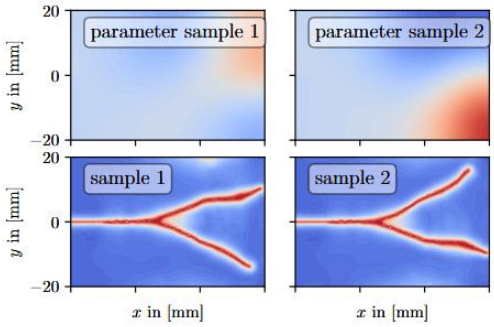
Stochastic parameter fields for phase field brittle fracture

Study Project | Master Thesis

The phase field method for brittle fracture is the state of the art method to model the nucleation and propagation of cracks in linear elastic media. In practice, crack propagation is a stochastic phenomenon: Depending on uncertainty in material parameters e.g. because of ageing of the materials or uncertainty in the loading, a crack can take multiple paths within a structure, leading e.g. to decreased stiffness or even catastrophic failure. The goal of the thesis is to identify the most important sources of uncertainty in benchmark phase field examples and to forward propagate the uncertainty to the FEM solution. This makes it possible to give bounds for the remaining stiffness of a structure.

Tasks:

- Thorough literature study
- Gaussian Process (GP) and Gaussian Markov Random Field (GMRF) implementation of all random fields in julia
- Parallel computing of a stochastic FE solution ensemble (structural mechanics coupled with phase field fracture)



Requirements:
Strong affinity towards advanced numerical methods, continuum mechanics and uncertainty quantification as well as programming in python or julia

Begin: As soon as possible

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