Seminar über Fragen der Mechanik

zu folgendem Vortrag wird herzlich eingeladen

Dienstag, 09.11.2021, 13:15 Uhr

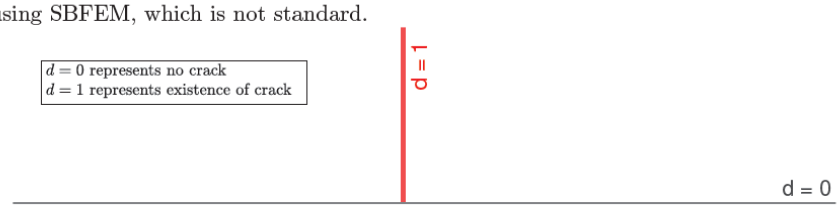
online: https://fau.zoom.us/j/97303812645
oder: Raum 01.025, Immerwahrstr. 1 (Registrierung: beate.hegen@ltd.uni-erlangen.de)

Towards phase field modelling using the scaled boundary finite element method

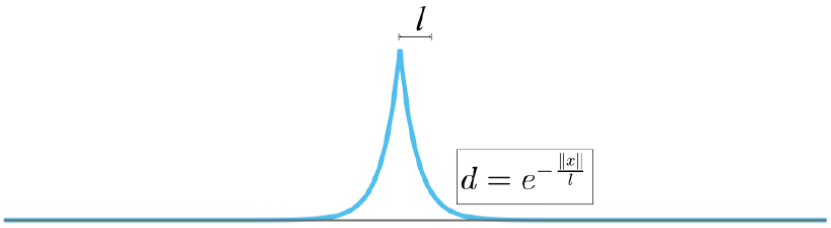
Ajay Kumar Pasupuleti

Universität Duisburg-Essen

Prediction of crack initiation and propagation is one of the interesting and challenging tasks for computational engineers and scientists. Although there are many theories available for providing a criterion for crack propagation, they lack in determining the crack initiation. In this work, an alternative to discrete crack modelling, the smeared continuous representation of crack using an additional variable called phase-field, parameterized by length scale (l) is presented. These models have the capability to intrinsically handle complex crack phenomena such as crack branching, although they become expensive when small lengthscales are of interest or crack path is not known prior. A semi-analytical method, the Scaled Boundary Finite Element Method(SBFEM) which facilitates adaptive mesh refinement via quadtree meshes, is employed to numerically solve the governing phase-field equation. A parameter that represents crack topology called regularized crack surface (Γ_l) is calculated from SBFEM solution and compared against the FEM result. This work provides a first step towards solving phase-field models of fracture using SBFEM, which is not standard.



Discontinuous description of crack.



Continuous description of crack for $l = 0.1$.

[1] C. Miehe, F. Welschinger, and M. Hofacker. Thermodynamically consistent phase-field models of fracture: Variational principles and multi-field fe implementations. *International Journal for Numerical Methods in Engineering*, 83(10):1273–1311, 2010.

[2] Chongmin Song and John P. Wolf. The scaled boundary finite-element method - a primer: solution procedures. *Computers and Structures*, 78(1-3):211–225, 2000.

Prof. Dr.-Ing. P. Steinmann
Prof. Dr.-Ing. K. Willner
Lehrstuhl für Technische Mechanik
Egerlandstraße 5, 91058 Erlangen

Prof. Dr.-Ing. S. Leyendecker
Lehrstuhl für Technische Dynamik
Immerwahrstraße 1, 91058 Erlangen