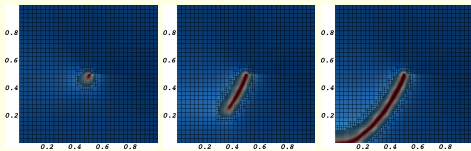


- 1 Motivation and problems
- 2 Attempts in verification
 - Some positive attempts
 - A still questionable test
- 3 Phase-field fracture model and numerical modeling
 - A posteriori error estimation and mesh adaptivity
- 4 A phase-field fracture model for nearly incompressible solids
 - Modeling
 - Numerical tests
- 5 Further validation attempts
 - Collaboration with DIK (German Kautschuk Institute)
- 6 Conclusions

Single edge notched shear test in mechanics ⁵



- Computational analysis of Γ -convergence properties ⁴, i.e., interplay of ε and h :
 - Case 1: $\varepsilon = 2h$,
 - Case 2: $\varepsilon = ch^{0.5}$, $c = 0.25$,
 - Case 3: $\varepsilon = ch^{0.25}$, $c = 0.125$.

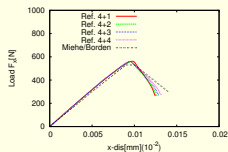
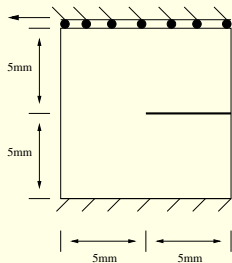


Figure: Setting and functional evaluation in terms of the load-displacement curve

⁴These studies were actually suggested by I. Babuska after discussions in 2013

⁵All parameters taken from Miehe/Welschinger/Hofacker (2010) CMAME, (2010) IJNME

Results: Crack path

- Use predictor-corrector mesh refinement (Heister/Wheeler/Wick, 2015) in order to work with a given small choice of the length-scale parameter ε in the crack region

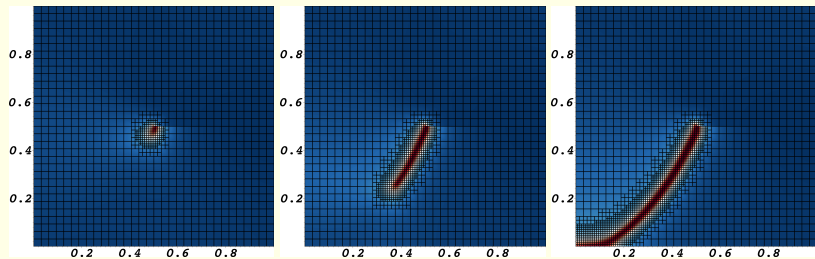


Figure: Crack path on 4 + 2-refined meshes. Crack propagation in red and dynamic mesh refinement at different times $T = 100, 120, 150$ using predictor-corrector refinement with $C = 0.8$.

Results: Spatial refinement for different ε

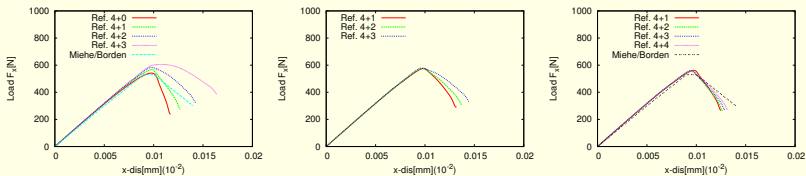


Figure: Mesh refinement studies for the three different Cases 1,2,3. We observe that if we choose h and ε according to the theoretical requirement of Γ convergence with $h = o(\varepsilon)$, then spatial mesh convergence is obtained (Cases 2+3)

- Convergence results are not satisfying!

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 - Numerical tests
- 5 Further validation attempts
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