STATIK DYNAMIK
PROF. DR. MESCHKE

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Master Thesis

Deconfinement ratio estimation for tunnels excavated with TBM

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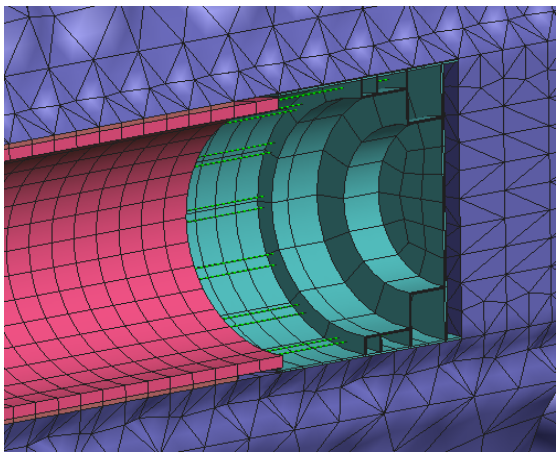
Background: The design of underground structures in rock masses requires expensive 3D simulations to get a precise insight into the stress state in the ground mass. However, this comes with a high computational cost. For this reason, 2D analyses play a key role when it is important to get a global idea about the behavior and the stress redistribution in the rock during excavation. Nevertheless, 3D simulations are still required to obtain a reliable value of the deconfinement ratio used in plane strain analyses. For conventional tunneling, methods already exist to obtain the deconfinement ratio as a function of the tunnel face distance. However, precise indications are not given for TBM excavated tunnels. Against this background, the aim of the thesis consists of the performance improvement of the Hoek-Brown fail ure criterion and the modeling of 2D and 3D analyses of the tunnel excavation process. The simulations are performed for the generation of a chart where the deconfinement ratio can be adequately chosen based on design parameters.



Tasks:

- Understanding the Hoek-Brown failure criterion with its implementation and the TBM tunneling process.
- Implementation improvement of the Hoek-Brown failure criterion in a finite element software and validation of the model.
- Analyses with 2D and 3D models of the tunnel excavation process.
- Construction of a chart for practical use.

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