

Masterproject (MP, 5 ECTS)

Stability Analysis of a Steep Rock Wall using 3DEC and ShapeMetriX^{3D}

Description

Conventional mapping of discontinuities is subjective and in the least cases reproducible. The results depend on the knowledge of the mapping geotechnical engineer, the time available for the mapping as well as the clarity of the discontinuity. Thus the results are prone to bias.

The digital mapping programme ShapeMetriX^{3D} (3GSM GmbH) can exclude some of the disadvantages of conventional mapping and makes a geotechnical model more reliable. The results, dip angle, dip direction and spacing, obtained by ShapeMetriX^{3D} can be implemented in 3-dimensional models of the rock mass to investigate the stability of the rock face.

This thesis focuses on the implementation of the digital ground model of the rock face into the 3-D modelling software 3DEC (Itasca Inc.). Aim is to compile more realistic models for the safety analysis of rock faces and to investigate the failure mechanisms in the model. It shall contribute to the automatic discontinuity recognition in 3-D rock face models. Basic skills in MATLAB (The MathWorks Inc.) are of advantage.

Following questions shall be elaborated:

- How is the stress distribution within the rock wall?
- Can unstable regions be identified in respect to weathering and erosion?

The elaboration of this work consists of the following steps:

- Preparation of a task schedule with mile stones
- Literature research on rock mass modelling
- Come to grips with ShapeMetriX^{3D} and 3DEC
- Writing a tool for the conversion of ShapeMetriX^{3D}-data into a 3DEC-Code
- Sensitivity analysis regarding dip angle/dip direction, friction angle and shear resistance
- Writing a scientific report with the results of the analysis.

Templates for the scientific report can be found on the institute's homepage. There is also a guideline for scientific writing free downloadable at the homepage, whose compliance is mandatory. The language for the report can either be in English or in German.

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