

Master's Thesis (MT, 30 ECTS)



Sensitivity analysis of the 3D surface roughness influence on the block sliding/rotation

Description

The block motion is strongly influenced by the roughness of the shear/sliding plane. The rougher a surface the more force is needed to mobilize a block to slide. Recent research focuses on the surface roughness estimation based on 3D surface data acquired at different scales (from few centimetres to tens of meters). With the results, it is possible to both improve the determination of shear strength parameters of sliding planes and to introduce a direction- and scale-depended mode of movement.

In this project, a three-dimensional model of a rough surface is used for the numerical simulation of a sliding block. The research shall answer the following questions:

- What is the influence of the 3D surface roughness uncertainty on the rock block stability? In other words, how precise must the 3D roughness be determined in order to get reliable results for the stability analysis?
- What is the influence of the roughness scale on the shear strength and on the rock block movement?
- To what degree controls the direction-dependent 3D surface roughness the transformation mode (translation, rotation)?

Methodology

- Literature research block kinematics, friction and 3D surface roughness.
- Establishment of a numerical model (3DEC) with a sliding block problem investigating the three cases:
 - o uniform surface roughness at certain scale
 - o direction-dependent surface roughness at certain scale
 - o scale-dependent surface roughness
- A sensitivity analysis considering the precision of the input 3D roughness.
- Writing a technical report summarizing results.

This project shall contribute to an improvement in the analysis of the stability of block rock masses using remote sensing and numerical modelling.

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

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Start by appointment

Duration ca. 6 months

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