

ANNOUNCEMENT MASTER THESIS

“Evaluation of Stress State Based on Hyperspectral Imaging in the Visible and NIR Region”

Aim of the thesis: The objective of this thesis is to investigate the causation between the stress state of rock samples and their spectral reflectance in the visible and near-infrared (NIR) regions (200–1020 nm). The work will be based on hyperspectral imaging using the Specim IQ camera and will aim to identify spectral indicators of mechanical stress.

Description: Hyperspectral imaging has become a promising tool in geomechanics for detecting subtle changes in material properties. In this thesis, hyperspectral data will be used to assess how stress conditions influence the reflectance spectra of rock specimens. The findings may contribute to the development of non-destructive methods for stress analysis in geological materials.

As part of this study:

- A literature review will be conducted to assess current applications of hyperspectral imaging in geomechanics and stress detection.
- Laboratory experiments will be carried out on various rock types using the Specim IQ hyperspectral camera, with controlled application of mechanical stress.
- The collected hyperspectral data will be processed to identify shifts or trends in spectral reflectance related to stress conditions.
- Statistical methods will be applied to evaluate potential correlations between spectral features and mechanical stress parameters.

Requirements: Basic knowledge of geomechanics, basic understanding of spectral data analysis and statistic. Experience with laboratory measurement techniques and statistical evaluation is an advantage.

Timing: Start possible upon agreement; ideally 2025.

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