



INSTITUTE OF ROCK MECHANICS AND TUNNELLING

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FACT SHEET to the research project HSSR

SHORT TITLE / ACRONYM

HSSR

LONG TITLE

Hard Soil – Soft Rock

DESCRIPTION

Many engineering problems in geotechnics can be linked to excavations in hard soils or in soft rocks (hereinafter referred to as 'HSSR'). Challenges already arise within the characterization of the material in situ, which is fundamental for all (numerical) calculations. Incomplete descriptions of the composite, its constituents and the material behaviour, or the use of unsuitable characterization methods, eventually result in an inadequate design. Unfortunately, standardized characterization methods are missing and the mechanical behaviour is strongly governed by the applied confining stress (e.g. brittle or ductile localization). The peculiar problem of modelling and testing such materials is the main topic of this research subject.

Common in situ testing techniques like cone penetration tests and dilatometer measurements are often at the cutting edge of what is technologically feasible. The limits of these tests must be examined and the derivation of the ground properties with respect to the measured parameters should be investigated. In addition to the on sight tests, numerical analyses are conducted to improve the understanding of the mechanical behaviour of HSSR. The investigations will be limited to isotropic and homogeneous ground, without any macro structure (e.g. stratification, schistosity or jointing). The research activity involves the application and comparison of several constitutive laws, described in different elasto-plastic frameworks, which empirically fit better either to the behaviour of stiff soils or should describe the behaviour of soft rocks better.

The research goals are the evolution of conventional in situ testing techniques in order to get reliable ground parameters, the identification of existing gaps in modelling HSSR and the outline of strategies to overcome the main shortcomings in the development of future testing equipment and the utilization of appropriate constitutive laws for numerical simulations.

PROJECT COORDINATOR

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RELATED MASTER'S THESES

YEAR	AUTHOR	WORKING TITLE
2019	Harmuth	In situ investigations of hard soil - soft rock <i>written in German, still in progress</i>
2019	Wallner	Numerical analyses of hard soil - soft rock considering different constitutive laws <i>still in progress</i>

RELATED PUBLICATIONS

YEAR	AUTHOR(S)	WORKING TITLE
2020	Stauder & Marcher	Numerical modelling of "hard soil and soft rock" – a contribution towards the understanding of the mechanical behavior of weak rock
2019	Stauder & Marcher	The brittle to ductile behavior of "hard soil and soft rock" – experimental review and challenges for constitutive modelling

RELATED THIRD-PARTY FUNDED PROJECTS

YEAR	PROJECT DESCRIPTION	INFORMATION TO FUNDER(S), FUNDING PROGRAM(S) AND CO-OPERATION PARTNER(S)
2019 / ongoing	S7 freeway: Limits of conventional in situ testing techniques considering hard soils or soft rocks.	<ul style="list-style-type: none"> Funder: ASFINAG – Austrian road construction authority Funding program: - Co-operation partner: ASFINAG & Institute of Soil Mechanics, Foundation Engineering and Computational Geotechnics, TU Graz