Wydział Górnictwa i Geologii

Politechniki Śląskiej w Gliwicach

WŁASNOŚCI WYTRZYMAŁOŚCIOWE I ODKSZTAŁCENIOWE NIECIĄGŁYCH OŚRODKÓW SKALNYCH W ŚWIETLE WYNIKÓW BADAŃ LABORATORYJNYCH I SYMULACJI KOMPUTEROWYCH

Praca doktorska

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Abstract

Dissertation describes issues of rock mechanics. The subject of this dissertation are the strength and deformation properties of jointed rock mass. The aim of this study was to investigate these properties based on laboratory experiments and computer simulations.

Laboratory tests have been conducted on the behavior of individual rock samples with single fracture under triaxial compression at confining pressures of up to 30 MPa. Examined the effect of confining pressure, wall roughness and orientation discontinuities relative orientations of external loads on the behavior of discontinuous rock mass.

Numerical models of different structural types of rock were build and carried out computer simulations of triaxial compression tests of these models. Built models reflect the intact rock mass (solid), the rock mass affected single and multiple systems of cracks.

Using the results of experimental and numerical analysis described in detail how, confining pressure, the orientation of discontinuities, the roughness of the walls of the discontinuities affect the behavior of jointed rock. Also formulated equations describing the dependence of ultimate strength and stiffness of the confining pressure for different structural types of rock.

The aim of the study was also determine modules longitudinal stiffness models and to determine the constants in a nonlinear generalized Hoek and Brown criterion – m_b , s and a, which so far have been determined based on equations of unknown origin using GSI factor. In this work it is shown how the values of these constants depend on the size of the confining pressures and structural properties of the model, ie. the number of blocks, the number of joints and size of blocks.