

論 文 内 容 要 旨

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学位論文題目	Time dependent behavior of discontinuities and its relationship with long-term strength (応力緩和・クリープ試験に基づく岩石不連続面の長期挙動に関する研究)		
<p>内容要旨</p> <p>Rock mass, as an engineering material, is a complex geological material containing numerous discontinuities such as geological faults, joints, fractures, etc. Discontinuities are among the most important factors that governing the mechanical behavior of a rock mass. Investigated data has demonstrated that the failure of the rock engineering along discontinuities is always not a brittle behavior but progressive damage after years or decades by creep and stress relaxation. Currently, intensive emphasis has been put on studying the time-dependent behaviors of rock masses through laboratory creep tests. However, stress relaxation behaviors and its correlation with long-term strength has been rarely investigated.</p> <p>In this study, a series of conventional shear tests, shear creep tests and shear relaxation tests under different normal stresses were performed on artificial discontinuities with different Joint Roughness Coefficient (JRC). Special interests are given to understand the time dependent behaviors of discontinuities, especially stress relaxation behaviors, and their relationship with long-term strength of discontinuities.</p> <p>The main research contents and some typical results are as follows:</p> <p>1) A series of stepwise shear creep tests of discontinuities were conducted, and evolutions of creep and creep rates are analyzed. Accordingly, an improved K-B model was proposed to describe the creep characteristics of discontinuities, and the fitting results agree well with test results.</p> <p>2) The isostress cyclic loading method (ICLM) was proposed to study the shear stress relaxation behaviors of discontinuities. Stress relaxation behaviors illustrated as stress relaxation curves under different normal stress as well as cyclic loading were analyzed. Accordingly, a nonlinear model (H-K-M) was proposed to describe the stress relaxation characteristics of discontinuities, and the fitting results present a good agreement with test results.</p> <p>3) Correlation between stress relaxation behavior and long-term strength, as well as between creep behaviors and long-term strength were analyzed. Stress relaxation method is put forward and proposed to determine long-term strength of discontinuities, from which the obtained long-term strengths present a good agreement with Mohr-Coulomb shear formula. Besides, long-term strengths were also obtained by creep tests. Differences between these methods were compared, which shows that stress relaxation method is more accurate.</p>			