

FINITE ELEMENT ANALYSIS ON CREEP BEHAVIOR OF DREDGER FILL SLOPE ON SOFT FOUNDATION

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Abstract One of the important mechanical behaviors of soft clay is time-dependency of the stress-strain behavior. A visco-elasto-plastic rheological model is presented for describing a time-dependent behavior of dredger fill slope on soft foundation. And It is implemented in a finite element program. As an actual example, the visco-elasto-plastic behavior for a filled slop of soft clay is studied and some valuable conclusions are drawn.

Key words dredger fill, creep, visco-elasto-plastic property, finite element analysis

ACOUSTIC EMISSION AND CRACK DEVELOPMENT IN ROCKS

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Abstract of PhD thesis The research concentrates mainly on the development of failure process in rock materials and the characteristics of associated acoustic emission through both laboratory and numerical investigations. Various aspects are discussed in detail, and these include Kaiser effect, acoustic emission (AE) behaviour under uniaxial compression and tension, visualization of failure process and parametric studies using numerical approach.

Laboratory tests have been carried out to study the Kaiser effect on several types of rock in Hong Kong. Recognizing that the AE counts are transient elastic waves due to local damages of rock, the quantitative relation between AE counts and deformation of rock specimens has been established. Subsequently, an expression for Kaiser effect under uniaxial stress state is derived based on damage theory. The prediction of acoustic emission behaviour is found to be in good agreement with experimental results.

Techniques on servo controlled tests on rock and acquisition of AE signals are also explored and discussed. Source location algorithms and techniques are applied to determine the AE sources in two and three-dimensional rock specimens.

Acoustic emission behaviour of rock specimen under load has been scrutinized by analysing AE parameters and AE sources in both compression and tension. Three characteristic stages of failure can be identified according to the feature points on the AE curves. For each stage, micro-cracks which are responsible for the main sources of AE can be traced so that the process of crack formation, coalescence and development can be virtually "visualized" step by step.

Simultaneously, numerical simulations are carried out in order to study the changes in stress and deformation distribution during the failure process. It provides new insight on the formation mechanism of failure zones and the development of cracks. Parametric studies are also conducted to assess the effect of various factors on the failure process and failure mode.

Key words acoustic emission(AE), crack in rocks, servo controlled tests, Kaiser effect

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