Numerical analysis of tunneling in soft soil with strain-softening behaviour

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Abstrak

ABSTRACT
Nowadays, the ways, how to solve the mass transportation problem in the big city become the major problem for the government. Some difficulties come when the mass transportation facilities can't be build at the ground surface because many buildings and services will be disturbed. For avoiding that, the mass transportation facilities usually are built in the underground. It means that we have to excavate the underground to make a tunnel. Excavating a tunnel generates ground displacements and deformations, which can affect the existing buildings and services in urban sites and can lead to unacceptable damages. To predict and to solve the all affects of excavating and tunneling have been a major engineering challenge.

A numerical analysis by using the finite difference method was implemented in the aim of developing a procedure for forecasting the all affects induced by tunneling. The influences of the strain-softening of the soil in the tunneling were discussed in this study. To take into account these behaviors, the Mohr-Coulomb criterion with strain-softening behavior were applied and as the comparison data we used the Mohr-Coulomb criterion without strain-softening behavior. We defined a new approximation for defining the strain-softening model. Two new constants obtained from the triaxial test, were used for defining this model. In this definition, the strain-softening behavior of the soil will depend on a;, and the peak values of cohesion and friction angle of the soil.

This study presented also the implementation of convergence-confinement method by using the deconfinement modeling and the Sequential Excavation Method (SEM). For deconfinement modeling, we analyzed in two dimensional with plane strain condition. And for the Sequential Excavation Method, we analyzed in axisymmetric condition and in three-dimensional condition. The finite difference software, Fast Lagrangian Analysis of Continua (FLAC), was used for simulating all the problems.