

9. Development of a Numerical Method for Deformation and Failure by Excavating Small Covering Soil Layers

Yasumasa Sotokoba, Shuji Morita, Hitoshi Fujita

With the progress of repair and renewal of agricultural waterway, for the efficiency of water distribution and the regional environment, it is necessary to construct large-scale underground structures and to be used for various purposes. We have developed numerical analysis methods in order to clarify soil behavior during the construction of large-scale underground structures with National Institute for Rural Engineering and four private companies. Our company has developed a numerical analysis method to clarify soil behavior, while excavating the ground of small covering soil layers by the roof and culvert method or other method. We proposed a numerical analysis model that is an elasto-plastic finite element method including strain localization into a shear band. Comparing model experiments with numerical analyses, it was found that the observed surface settlement and direction of shear band are simulated well by the finite element analyses. We confirmed the effectivity of this numerical analysis model through the comparison with the observational measurements at a site of the roof and culvert method.

Key words : elasto-plastic finite element analysis, small covering soil layers, excavation, shear band