NEW CONTRIBUTIONS OF THE THESIS

Thesis name: Research on geotechnical conditions serviced for designing and constructing deep excavations

Specialization: Construction Techniques for Underground Projects

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The thesis had achieved some key research results as follows:

1. Construction of deep excavations is unloading process for ground as well as loading process on temporary supporting structure systems. Stress and deformation states of the ground around supporting walls and pit bottoms change in many different stress path which can be seen most clearly for the ground behind the wall changing along stress reduction line σ3, σ1 is constant and bottom ground along excavation pits changes along stress reduction line σ1 and σ3 increases.

2. Triaxial pressing experiments are currently not suitable for simulating stress states on the back of walls during excavating periods. Triaxial pressing equipment based on the scheme of chamber pressing reduction (σ3) that are designed and improved by the thesis to base on normal triaxial pressing equipment, has been completed and tested with good results.

3. Triaxial pressing experiment in accordance with reduction scheme σ3 were implemented with many different types of ground to discover that some ground characteristics determined from this experiment differ with other rules resulted from conventional triaxial experiment: such as elastic modulus, friction angles and unit cohesive forces. Elastic modulus E of triaxial experiment reduce horizontal stresses faster than conventional triaxial experimental and computational results according to this data show results are consistent with actual measurement data.

4. Ground models describe stress-strain states of the ground based on conventional triaxial pressing experiments such as Hypecbon, Hardening or Cam-Clay all gain different results against actual because not using input parameters based on appropriate stress paths. Lade model fit with different stress paths, there should be some changes, improvement to fit with excavation pit problems as: establishment on relationships with basic characteristics of the ground such as unit adhesive forces and

friction angles for easy application in practical calculations, improvement of plastic deformation surfaces occurred on process of loading and unloading, and characteristics of initial elastic modulus. Improved Lade model presented in the thesis has met these requirements while using input parameters determined from triaxial stress experiment for reduction of horizontal stresses.

5. Software LadeDeep was built based on the improved model Lade fit with unloading stresses on the back of walls. The result of using LadeDeep on calculation and forecast of horizontal displacements of sheet wall construction for deep excavations of some specific projects and cross comparison using some common ground model currently used as well as the actual measured results in various stages of construction shows closely with reality and can apply them in calculating actual problems of deep excavations. The result of the thesis contributes a new forecasting methods into a range of many existing methods to serve for design and construction of deep excavations.

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