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复杂地质条件下浅埋暗挖地铁车站施工期地面沉降量FLAC3D分析

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摘要 浅埋暗挖地铁车站施工期地面沉降量对施工安全具有重要意义。北京地铁10号线苏州街车站为多套地层力学性质差异较大的复杂场地，根据地质勘察结果的地层三维空间分布状况，建立车站场地的三维地质模型；应用试验结果确定各类土层的物理力学参数；依据工程设计方案，概化洞桩法施工过程为6个施工步序；采用等效模拟的方法概化超前地层预加固；应用FLAC3D计算软件，优化开挖施工方案，模拟动态施工过程，分析各施工步序暗挖车站周围土体的变形量和地面沉降量；研究确定引起最大地面沉降量的施工步序。通过现已完成施工的导洞开挖步序施工变形监测结果与计算结果比较分析，验证计算结果的可靠性，根据计算结果预测地铁车站施工期的最终地面沉降量。

关键词 隧道工程；三维地层分布；地铁车站；地面沉降量；数值模拟

分类号

ANALYSIS OF GROUND SETTLEMENT OF A SUBWAY STATION UNDERCUT WITH SHALLOW OVERBURDEN DURING CONSTRUCTION WITH FLAC3D UNDER COMPLEX GEOLOGICAL CONDITIONS

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Abstract

The settlement of a subway station undercut with shallow overburden has important effect on the construction safety. The engineering field of Suzhou Street Station of Beijing No.10 Subway has complex strata with different mechanical characters. According to the three-dimensional spatial distribution of strata，a three-dimensional geological model of the subway station has been built. The physico-mechanical parameters of every stratum have been ascertained by test. On the basis of the subway engineering，the course of the cave-pile method is abstracted to six construction step. The equivalent simulation method is used to abstract the preceding reinforcing stratum. The FLAC3D is used to simulate the construction process. The caving project is optimized by simulation. The deformations of the soil around the station and ground settlement in every construction step have been analysed. The construction step that causes the largest ground settlement has been found by three-dimensional numerical simulation. Through the comparison between the deformation monitoring data of pilot drift cavity with calculation results，the reliability of the calculation results has been testified. At the same time，the eventual ground settlement is forecasted by the calculation results.

Key words tunnelling engineering；three-dimensional distribution of stratum；subway station；ground settlement；numerical simulation

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