

浅埋暗挖隧道近距施工引起的上覆地铁结构变形分析

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ANALYSIS OF STRUCTURAL DEFORMATION OF OVERLYING SUBWAY STATION INDUCED BY APPROACHING TUNNEL EXCAVATION IN SHALLOW DEPTH

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摘要

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摘要 北京地铁4号线宣武门站分离式双洞隧道近距离垂直下穿既有2号线地铁车站。从整体变形和单个块体位移2个角度对既有车站实测位移进行分析, 得出浅埋暗挖隧道近接施工分步开挖过程中上覆地铁结构的变形规律: (1) 既有地下结构整体沉降符合Peck曲线变形规律, 而2个变形缝之间的块体结构位移则以转动为主, 呈现刚体运动特征; (2) Peck公式拟合得到的地层损失率为0.118%~0.187%, 其大小与既有地下结构是否存在、开挖断面大小无明显联系, 而与新建隧道支护体系架设时机及刚度密切相关; (3) 拟合得到沉降槽宽度系数为2.44~3.87, 为相同埋深天然地层的1.05~1.62倍, 沉降槽宽度系数与支护体系刚度无关, 而与工前地层加固、既有地下结构的有关, 且其大小与开挖面积基本呈线性关系。研究结果可为类似工程提供借鉴及参考。

关键词: [隧道工程](#) [近接施工](#) [结构位移](#) [Peck公式](#)

Abstract: Separated two-track tunnels of Beijing Metro Line No.4 Xuanwumen station vertically cross beneath Line No.2 Xuanwumen station. Analyzing the measured displacement of the existing station structure both from the global deformation and the single structural block displacement, we obtain the deformation law of the overlying existing structure during excavation by steps. Research shows that: (1) The existing underground structure's integral settlement complies with Peck formula, but the displacement of single block between two movement joints is rotation mainly and presents rigid body rotation. (2) The ground loss ratio fitted by Peck formula is 0.118% - 0.187%. It is unrelated to the existence of the underground structure and the size of excavation section, but it is associated with the new tunnels' supporting time and supporting stiffness. (3) The settlement trough width coefficient fitted by Peck formula is 2.44 - 3.87, which is the 1.05 - 1.62 times than the coefficient of natural stratum. It is unrelated to supporting stiffness, but it is associated with the reinforcement method, the existence of underground structure and the size of excavation section. The research result can provide reference for the similar engineering.

Keywords: [tunnelling engineering](#) [approaching construction](#) [structural displacement](#) [Peck formula](#)

Received 2013-02-20;

引用本文:

王剑晨, 张顶立, 张成平, 房倩, 苏洁, 陈立平. 浅埋暗挖隧道近距施工引起的上覆地铁结构变形分析[J]. 岩石力学与工程学报, 2014, V33(1): 90-97

WANG Jianchen, ZHANG Dingli, ZHANG Chengping, FANG Qian, SU Jie, CHEN Liping. ANALYSIS OF STRUCTURAL DEFORMATION OF OVERLYING SUBWAY STATION INDUCED BY APPROACHING TUNNEL EXCAVATION IN SHALLOW DEPTH[J], 2014, V33(1): 90-97

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