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预留土对非饱和基坑支护结构的影响

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INFLUENCE OF EARTH BERM ON RETAINING STRUCTURE FOR UNSATURATED PIT EXCAVATION

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摘要 基于《建筑基坑支护技术规程》的相关规定和非饱和土强度理论,建立了考虑预留土的嵌固和水平支撑双重作用和非饱和特性时支护结构嵌固深度、位移和内力的计算方法。研究表明,预留土的作用可以概括为两个方面:① 虽然能提供的水平抗力不是很大,但由于其合力力臂较大,因此对支护结构有明显的嵌固作用,从而可以缩短支护结构的嵌固深度;② 能在支护结构上部形成弹性支承,从而减小支护结构的水平位移和内力。算例分析表明,采用预留土并降水的施工方法能大幅度缩小支护结构的嵌固深度、位移和内力。因此,在条件适当的条件下,用基坑内侧预留土并降水的施工方法不仅可以省去水平支撑、降低支护结构嵌固深度,同时还可以节约投资和缩短工期,具有良好的经济效益、社会效益和环境效益。

关键词: 基坑开挖 预留土 非饱和土 水平抗力系数 折减系数

Abstract: Based on the technical specification for retaining and protection of building foundation pit and strength theory for unsaturated soils, computational methods are constructed for embedded depth, displacement and inner force determination of retaining structure for unsaturated pit. The mechanical studies show that the functions of earth berm for unsaturated pit include two aspects. The first one is that the necessary embedded depth of the retaining structure can be reduced because of the longer force arm of the horizontal resisting force. And the second one is that the displacement and inner force of the retaining structure can be reduced for its horizontal elastic ssupporting. Analysis on an example illustrates that the construction method using earth berm in pit excavation together with lowering groundwater can decrease the embedded depth, displacement and inner force of retaining structure remarkably. Therefore, the construction method is economical due to sparing horizontal supporting structure as well as reducing project time.

Key words: pit excavation earth berm unsaturated soil horizontal resisting force coefficient reduction coefficient

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[1] 张建全, 王世杰. 天津站交通枢纽工程主广场及海河地道工程监测总结报告[R]. 2008. Zhang Jianquan, Wang Shijie. Field monitoring report of the ma plaza project and Haihe tunnel project of Tianjin transport hub [R]. 2008. (in Chinese)

[2] 叶建尧, 华锦耀. 软土深基坑围护的应急措施[J]. 浙江建筑, 2008, 25(4): 23-25, 30. Ye Jianyao, Hua Jinyao. Emergency measures for protection constructions of soft soil deep foundation pit[J]. Zhejiang Construction, 2008, 25(4): 23-25, 30. (in Chinese)

[3] 钱家欢, 殷宗泽. 土工计算原理[M]. 第2版. 北京: 中国水利水电出版社, 1996. Qian Jiahuan, Yin Zongze. Principle and calculation of soil engineerir [M]. 2nd ed. Beijing: China Hydraulic and Electric Press, 1996. (in Chinese)

[4] 龚晓南. 基坑工程手册[M]. 北京: 中国建筑工业出版社, 1998. Gong Xiaonan. Excavation engineering design and construction handbook [M]. Bei China Architecture and Building Press, 1998. (in Chinese)

[5] 张玉成, 杨光华, 胡海英, 等. 在软土地基上有反压护道路堤及堤坝的稳定计算[J]. 岩土力学, 2007, 28(增 1): 844-848. Zhang Yucheng, Yang Guangh Haiying, et al. Stability study of embankment or dam with back berm on soft soil foundation [J]. Rock and Soil Mechanics, 2007, 28(Sup. 844-848. (in Chinese)

[6] Smethurst Joel Andrew, Powrie William. Effective-stress analysis of berm-supported retaining walls [C]// Proceedings of the Institution o Engineers: Geotechnical Engineering. Thomas Telford Services Ltd, United Kingdom, 2008: 39-48.

[7] Daly M. P, Powrie W. Undrained analysis of earth berms as temporary supports for embedded retaining walls [C]// Proceedings of the Institution of Civil Engineers: Geotechnical Engineering. Thomas Telford Services Ltd, United Kingdom, 2001: 237-248.

[8] Clough G W, Denby G W. Stabilizing berm design for temporary walls in clay [J]. Journal of Geotechnical Engineering Division, ASCE, 1971 (GT2): 75-90.

[9] 郑刚, 陈红庆, 雷扬, 等. 基坑开挖反压土作用机制及其简化分析方法研究[J]. 岩土力学, 2007, 28(6): 1162-1166. Zheng Gang, Chen Hongqing, Lei Y et al. A study of mechanism of earth berm and simplified analysis method for excavation [J]. Rock and Soil Mechanics, 2007, 28(6): 1162 1166. (in Chinese)

[10] 李顺群, 郑刚. 复杂条件下Winkler 地基梁的解析解[J]. 岩土工程学报, 2008, 30(6): 873-879. Li Shunqun, Zheng Gang. Analytic solution of beam Winkler foundation in complex conditions [J]. Chinese Journal of Geotechnical Engineering, 2008, 30(6): 873- 879. (in Chinese)

[1] 徐明江;魏德敏. 非饱和土地基的三维非轴对称动力响应[J]. , 2011, 28(3): 78-085.

[2] 何浩祥;闫维明;陈彦江. 地震动加加速度反应谱的概念及特性研究[J]. , 2011, 28(11): 124-129.

[3] 王宏伟;钟善桐. 基于可靠度指标的空心钢管混凝土轴心受压构件设计 [J]. , 2010, 27(增刊I): 250-253.

[4] 张智卿;王奎华;李 强;卢萌盟. 非饱和土中端承桩纵向振动问题简化解[J]. , 2010, 27(5): 159-165,.

[5] 郑朝荣;张耀春. 吸气方法在高层建筑风荷载减阻中的应用[J]. , 2009, 26(增刊 I): 51-056.

[6] 周 靖;周 飞;. 地震动持时效应对阻尼折减系数的影响[J]. , 2009, 26(2): 78-084.

[7] 李顺群;柴寿喜;王 沛;刘双菊;. 非饱和土的系列强度试验研究[J]. , 2009, 26(11): 140-144.