

深基坑支护设计影响因素的有限元分析

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摘要 深基坑工程是当前岩土工程中的热点和难点问题之一, 如何有效控制基坑变形, 使基坑工程既安全又经济, 是人们一直探索的课题。深基坑的支护结构的变形是影响基坑变形的重要因素。针对武汉地区具有代表性的粉质粘土, 通过大量的真三轴试验模拟了基坑开挖过程中的应力路径, 了解了开挖过程中基坑土体的变形性状, 并得到了邓肯-张模型的各项参数, 建立了深基坑支护结构的非线性弹性模型。同时以平面应变有限元法为基础, 通过对武汉某基坑工程进行基坑变形的计算分析, 分析了支护结构的刚度、基坑的开挖宽度、土体的变形模量、插入深度、支撑位置和坑内土体加固、基坑开挖的时空效应和基坑周围水环境等设计、施工和自然环境因素对支护结构的变形的影响, 了解了基坑开挖过程中基坑支护结构变形、周围地层沉降的发展变化规律, 并提出了一些控制基坑变形的措施, 为深基坑工程的设计和施工提供了依据。

关键词 [基础工程](#); [深基坑](#); [支护](#); [真三轴试验](#); [弹塑性模型](#); [有限元](#)

分类号

FINITE ELEMENT ANALYSIS OF INFLUENCE FACTORS FOR TIMBERING DESIGN OF DEEP FOUNDATION PIT

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Abstract

Deep foundation pit engineering is one of pop and difficult problems in rock soil engineering. How to effectively control deformation of foundation pit and make foundation pit engineering safe and economical is the task that people always probe. Deformation for retaining structure of foundation pit is the important factor for effect on the deformation of foundation pit. This paper simulates the stress path in the excavation of foundation pit by large numbers of true triaxial tests in allusion to the silty clay, which is representational in Wuhan area. The deformation properties of soil mass in the excavation of foundation pit have been founded out and the parameters of the Duncan-Zhang soil model have been gained, and nonlinear elastic model of retaining structure of deep foundation pit is established. At the same time, the foundation pit deformation of a piazza in Wuhan is calculated by using the methods of the plane strain finite element. The factors of design, construction and nature environment on effect of the deformation of timbering structures are studied. These factors include the rigidity of timbering structures, the digging width of foundation pit, the deformation modulus of soil mass, the inserted depth, the bracing location and the reinforcing of soils, space-time effect of pit excavation and water environment of foundation pit etc. The deformation of timbering structures in foundation pit excavation and the developing and changing rules of

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the settlement of surrounding stratum have been founded out. Some measurements, which offer the reference to the design and construction of deep foundation pit, to control the deformation of foundation pit have been put forward.

Key words [foundation engineering](#); [deep foundation](#); [timbering](#); [true tri-axial test](#); [elastoplastic model](#); [finite element](#)

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