



管幕箱涵顶进施工中地表变形监测及有限元模拟

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Ground Surface Deformation in Construction of Box Jacking with Pipe Roof and Three Dimensional Finite Element Method Simulation

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摘要

上海市中环线虹许路一北虹路地下立交隧道工程采用了管幕施工与箱涵顶进相结合的施工方法.管幕箱涵顶进法是一种在软土中修建地下建筑物的新型暗挖技术,先用微型顶管技术在拟建的地下通道建筑物四周顶入钢管,然后将钢管间用锁口连接并注入防水材料构成防水地下空间,最后在拟建的地下通道空间内,采用软土开挖和预制箱涵顶进同步进行施工.箱涵顶进过程非常复杂,容易引起地表变形.结合实测数据研究超长大断面管幕箱涵顶进过程中地表变形的特征,得到一些与我国常规暗挖施工所不同的新规律,建立了能够考虑网格前管幕土欠挖、超挖施工工况的三维有限元模型,实现了箱涵顶进过程及其他地表变形的模拟,计算结果与实测地表变形较吻合.

关键词: [管幕法](#); [箱涵顶进](#); [地表变形](#); [三维有限元模拟](#)

Abstract:

A method of advancing box-culvert with pipe roof was used in soft soil ground for the first time in a tunnel of Shanghai Middle Ring Road. The first step is to jack a steel pipe or a tube of some other material into soil between starting and accepting shafts. Waterproof material is then injected into the lock-joint to form a close underground space. Construction of box culvert jacking is complicated, and easy to cause ground deformation. This paper studies characteristics of ground movement during construction of large section box-culvert jacking based on measured data. Some new laws of ground movement are found which is different from those of excavating methods. Three dimensional finite element method (FEM) model is established to simulate the process and ground movement of advancing box culvert. The model can simulate the state of excavating soil inside the pipe roof. Simulated data are compared with practical measurements, showing satisfactory results.

Keywords: [pipe roof method](#); [box-culvert jacking](#); [ground surface deformation](#); [three-dimensional finite element simulation](#)

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