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土木工程

路堤荷载作用下透水性混凝土桩减压降沉效应研究

张娜^{1,2}, 崔新壮^{1,2*}, 张炯^{1,2}, 周亚旭^{1,2}, 高智珺^{1,2}, 隋伟^{1,2}

1. 山东大学土建与水利学院, 山东 济南 250061; 2. 山东大学黄河冲淤积土工程技术研究中心, 山东 济南 250061

摘要:

透水性混凝土桩兼具了刚性桩的高强度特性和散体桩良好透水性的特点,适用于地基的加固处理。为了研究透水性混凝土桩地基处理技术对地基的减压降沉效应,基于有限元法和Biot固结理论对路基荷载作用下透水性混凝土桩复合地基的超静孔隙水压力、桩土应力比、水平位移、沉降等进行研究,并与散体桩和刚性桩进行了对比分析。研究发现透水性混凝土桩复合地基内累积的超静孔隙水压力能够迅速消散,说明透水性混凝土桩具有显著的减压效应;同时发现,透水性混凝土桩复合地基的水平位移和工后沉降较小,证明透水性混凝土桩在降低地基沉降方面具有显著的作用。因此,透水性混凝土桩特别适用于加固透水性差、工后沉降大的地基。

关键词: 透水性混凝土桩 复合地基 超静孔隙水压力 沉降

Settlement-controlling and pressure-reduction effect of pervious concrete pile under the action of embankment load

ZHANG Na^{1,2}, CUI Xin-zhuang^{1,2*}, ZHANG Jiong^{1,2}, ZHOU Ya-xu^{1,2}, GAO Zhi-jun^{1,2}, SUI Wei^{1,2}

1. School of Civil Engineering, Shandong University, Jinan 250061, China;
2. Engineering Research Center for Yellow River Alluvial Soil, Shandong University, Jinan 250061, China

Abstract:

With the advantages of both high strength of rigid pile and large permeability of granular pile, pervious concrete pile was suitable for reinforcing foundation. In order to study the settlement-controlling and pressure-reduction effect, based on finite element method and Biot's consolidation theory, the excess pore water pressure, pile-soil stress ratio, horizontal displacement and settlement of pervious concrete pile composite foundation under the loading of embankment were studied, and compared with those of gravel pile composite foundation and plain concrete pile composite foundation. It was found that the excess pore water pressure in the pervious concrete pile composite foundation was induced by the loading of embankment dissipated quickly, which showed that the pervious concrete pile had significant pressure-reduction effect. Furthermore, the pervious concrete pile composite foundation had the minimum horizontal displacement and post-construction settlement, which proved that the pervious concrete pile could evidently reduce the settlement of foundation. Therefore, the pervious concrete pile was particularly suitable for reinforcing foundation with poor water permeability and large post-construction settlement.

Keywords: pervious concrete pile composite foundation excess pore water pressure settlement

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通讯作者: 崔新壮(1974-),男,山东寿光人,教授,博士,主要研究方向为岩土力学. E-mail: cuixz@sdu.edu.cn

作者简介: 张娜(1989-),女,河南郑州人,硕士研究生,主要研究方向为道路工程. E-mail: znazna@163.com

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