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软土地基加筋石灰土路堤离心模型试验研究

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摘要　对打设竖向排水体的软土地基加筋石灰土路堤进行离心模型试验，并同时进行了1组不加筋石灰土路堤的对照试验。在地基土中及其表面埋设和安装了位移计、孔隙水压力计和土压力计，并在模型土工格栅上黏贴了应变片以测试加筋拉力。试验结果表明：(1) 加筋减少了沉降量，其减少量8%左右，加筋路堤呈现较明显的地面隆起，而不加筋路堤主要表现为沉降；(2) 加筋和不加筋路堤地基中两者的孔隙水压力基本接近，在每一堆载休止期，孔隙水压力都呈较明显的消散；(3) 加筋后，路堤堆载压力可明显扩散，加筋路堤中心下地基土压力比不加筋路堤要小6%～10%，而坡脚下土压力前者比后者大40%左右；(4) 模型格栅拉力随加速度的增大变化规律较好，在休止期拉力持续增大，与沉降规律一致。在堆载高度0～2 m期间，格栅拉力较均匀分布，其后格栅中心处拉力明显比两侧增大；(5) 加筋对提高石灰土路堤的稳定性作用明显，可考虑在石灰土中加筋以提高其抗拉强度，并可进一步提高路堤的稳定性。

关键词　土力学；路堤；软土地基；石灰土；土工格栅；塑料排水板；离心试验

分类号

CENTRIFUGAL TEST ON REINFORCED EMBANKMENT WITH LIME-STABILIZED SOIL AS BACKFILL ON SOFT CLAY

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Abstract

Two centrifugal tests of reinforced and unreinforced embankments with lime-stabilized soil as backfill on soft clay with vertical drains were performed to investigate the reinforcement mechanisms and effects. The instruments used to measure displacement，pore water pressures and earth pressures were installed；and the strain gauges were glued with epoxy resin on the surface of the model with geogrid. The following test results are achieved. (1) Compared with the unreinforced embankment，the settlement of reinforced embankment is reduced approximately by 8%；and the heave of the reinforced embankment foundation is observed，whereas unreinforced embankment dominantly shows settlement. (2) Pore water pressures in the foundations of reinforced and unreinforced embankments are basically similar；and during each loading break，pore water pressures are obviously dissipated. (3) Earth pressures under embankment base are distributed uniformly due to geogrid reinforcement. Earth pressures under central part of the reinforced embankment are 6%–10% less than those of unreinforced embankment，whereas earth pressures under the slope toes of the former are approximately 40% greater than those of the latter. (4) Tensile forces in the model geogrid have a good changing law with the acceleration increasing. During loading break，tensile forces increase，which is consistent

with the settlement changing law. The distribution of the tensile forces shows uniform until the reinforced embankment is loaded up to 2 m in height. Afterwards，the tensile forces at the central part obviously increase more than those at two sides. (5) An idea to add geosynthetics to the embankment¢s lime-stabilized soil is proposed so as to improve its tensile strength，which also makes the embankment more stable.

Key words soil mechanics；embankment；soft foundation；lime-stabilized soil；geogrid；plastic drainage boards；centrifugal test

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