

砂土中成桩工艺对桩基承载性能影响的室内模型试验研究

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LABORATORY MODEL TEST RESEARCH ON INFLUENCE OF PILING TECHNIQUES ON BEARING PERFORMANCE OF PILE FOUNDATIONS IN SAND

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摘要

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摘要 模型试验是桩基承载性能研究中不可或缺的一种科研手段。通过设计模型试验, 基于试验数据进行整理分析, 研究砂土中成桩工艺差异对桩基承载性能的影响, 经过对比研究, 分析桩基的受力分布特点和沉降变形特性, 探讨成孔卸荷对灌注桩承载特性产生的作用效应。结果表明: 试桩的荷载-沉降(Q-s)曲线均呈陡降型。静压桩承载力最大, 但曲线突降性方面不如预埋桩和灌注桩明显; 成桩工艺不同会影响桩基的荷载传递性能, 由于成孔卸荷和挤土效应差异, 静压桩沿深度方向的荷载传递性能相对于灌注桩和预埋桩要差; 4桩桩侧摩阻力在一定深度都出现强化现象, 静压桩桩侧阻力强化位置略高于灌注桩和预埋桩, 这是因为挤土效应使桩侧阻力增大, 成孔卸荷和裹膜撤除产生的侧向卸荷会在一定程度上削弱桩侧阻力; 桩侧阻力的极值发挥和极值点位置受成桩工艺影响较大; 侧阻与端阻异步发挥且其最大值并非同时到达, 端承力占桩顶荷载的比例随上部荷载变化而变化。

关键词: 桩基工程 成孔卸荷 灌注桩 室内模型试验 侧摩阻力 荷载传递

Abstract: Model test is a necessary scientific method which is used in the research on bearing performance of pile foundation. The differences of bearing capability of piles using different piling techniques are significantly studied through designing model test and analyzing test data, and the influence of unloading effect caused by cavities drilling to bearing mechanism of bored piles, as well as the mechanical and settlement property of piles, are also discussed by comparative analysis. The study indicates that: Q-S curves of test piles appear steep drop type; the bearing capacity of jacked pile is the most prominent of all, but less obvious in pre-buried pile and bored piles in steep performance. The load transfer performance of test piles will be affected by different construction methods, and the load transfer capability of jacked pile in the depth direction is worse than that of pre-buried pile and bored piles due to the difference between compacting effect and unloading effect. The skin frictions of four piles are intensified in certain depth, and the strengthened position of jacked pile is slightly higher than that of bored piles and pre-buried pile, which is caused by the fact that compacting effect makes skin friction increase. Otherwise, unloading effect caused by cavities drilling of bored piles and the backout of film wrapped around pre-buried pile weakens skin friction to a certain extent. The extremum exertion and extreme points location of skin friction of piles are highly influenced by different piling techniques. Skin friction and tip resistance do not display in identical time and do not achieve maximum at the same time; and the proportion of tip resistance in total working load varies with upper load.

Keywords: pile foundations unloading effect caused by cavities drilling bored piles laboratory model test skin friction load transfer

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