

考虑基桩影响的粉砂地基深基坑流砂模型试验研究

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摘要 采用自制的基坑工程渗流、渗透破坏模型试验装置, 通过对水头与土体变形的观测, 研究均质砂土与粉土地基基坑工程中考虑基桩影响的渗透破坏问题, 揭示基坑工程土体渗透破坏模式。结合有限元数值模拟分析, 从土体应力状态改变的角度研究基坑工程的渗透破坏机制, 并分析基桩对土体渗透破坏的影响以及渗流对基桩受力变形的影响。研究表明, 受渗透力的作用, 围护结构底部土体首先进入塑性状态, 当坑内土体形成贯通的塑性区时, 即发生渗透破坏。在均质地基中, 其模式为楔形体破坏。受黏聚力的影响, 粉土破坏时的水头差较砂土大, 同时基桩的影响也会增大破坏时的水头差。

关键词 [基础工程](#); [模型试验](#); [有限元](#); [渗透破坏](#); [临界水力坡降](#); [深基坑](#); [侧摩阻力](#)

分类号

MODEL EXPERIMENTS ON SEEPAGE FAILURE OF DEEP FOUNDATION PIT CONSIDERING INFLUENCE OF FOUNDATION PILES IN SANDY SOIL

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Abstract

Using home-made seepage and seepage failure test apparatus, model experiments in different conditions were carried out. Based on the analysis of water head and soil deformation results, the seepage failure problem of deep foundation pit in uniform sandy and silty soil is investigated. The results demonstrate the seepage failure modes in deep foundation pit in uniform sandy and silty soil. Combined with numerical simulation and model experiments, the mechanism of seepage failure is analyzed based on the change of soil stress. Moreover, the effect of foundation pile on seepage failure and the effect of seepage on the deformation and stress of foundation pile are studied. According to the research, the plastic strains firstly appear on the foot of the supporting structure. Seepage failure takes place when the plastic zone joints together; and the failure model is wedge type in uniform soil. Influenced by cohesion, the water head difference in silt is more than that in sand when seepage failure takes place.

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Influenced by piles, the water head difference of seepage failure also increases.

Key words [foundation engineering](#); [model experiment](#); [finite elements](#); [seepage failure](#); [critical hydraulic gradient](#); [deep foundation pit](#); [skin friction](#)

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