

## 高速拓宽软土路基差异沉降数值计算及监测分析

谭儒蛟<sup>①</sup>, 李明生<sup>①</sup>, 张建根<sup>①</sup>, 徐文杰<sup>②</sup>

①天津市市政工程设计研究院 天津 300051;

②清华大学 水利土木工程学院 北京 100084

## NUMERICAL CALCULATION AND MONITORING ANALYSIS ON DIFFERENTIAL SETTLEMENTS OF SOFT SOIL SUBGRADE IN EXPRESSWAY EXTENSION PROJECT

TAN Rujiao<sup>①</sup>, LI Mingsheng<sup>①</sup>, ZHANG Jiagen<sup>①</sup>, XU Wenjie<sup>②</sup>

①Tianjin Municipal Engineering Design and Research Institute, Tianjin 300051;

②School of Civil Engineering of Tsinghua University, Beijing 100084

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**摘要** 路基差异沉降控制是软土地区高速拓宽工程中的关键性技术问题之一,本文以北方某高速拓宽工程的试验段为例,运用ABAQUS软件进行了拓宽软土路基变形的有限元数值计算,并与路基现场变形监测数据进行对比分析,数值计算与实测结果基本吻合,结论一致地反映了路堤填筑初始阶段新路基的沉降速率较大,旧路基在填筑后期才产生较明显的附加沉降变形;路基变形在拓宽侧呈现明显的“沉降盆”效应,新、旧路基的差异沉降是造成路基路面纵裂的主要因素;桩端地基土呈现出较明显的侧向挤压效应,则表明采用带帽PTC桩复合地基中用于减沉时,桩端应置于具有较高承载力的有效持力层上。

**关键词:** 高速拓宽 软土路基 差异沉降 带帽PTC桩 数值计算 监测分析

**Abstract:** How to control of the differential settlement is a key task for the soft soil subgrade in Expressway extension project. This paper examines the experiment section of one expressway extension project in northern China. The finite element calculation is carried out for the deformation of widening soft soil subgrade. The Abaqus software is used. The calculation results are in accordance with the deformation monitoring information at field tests. These results conformably demonstrate the deformation characteristics that widening subgrade presents larger settlement rate in the initial stage of embankment filling. But the old subgrade has obvious additional settlement. The basin-curve of settlement appears in the bottom of widening subgrade. The differential settlement between the new and old subgrade is one of the main reasons that inducing longitudinal subgrade cracks. The foundation soil near the bottom of the composite foundation of prestressed thin-wall concrete (PTC) pile with cap presents obvious extrusion deformation in horizontal directions, which shows that PTC pile tip should be placed at effective bearing stratum with relatively high capacity.





**Key words:** Expressway extension project Soft soil subgrade Differential settlement PTC pile with cap Numerical calculation Monitoring analysis

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