Pile-Soil Interaction and Negative Skin Friction of Pile Foundations with Different Pile Diameters in High Fill Sites (Postprint)

Authors: Lu Yunhua, Li Sheng, Li Sheng

Date: 2025-08-24T00:00:00+00:00

Abstract

To clarify the time-dependent evolution of pile-soil interaction and the variation law of negative skin friction for pile foundations in high-fill loess sites, and to elucidate the influence of internal force variation on the long-term service performance of pile foundations, this study considers the creep deformation of backfilled loess and employs the finite difference software FLAC3D. The Burgers model is adopted to simulate the creep characteristics of backfilled loess, analyzing the time-dependent evolution of internal forces, displacement, and neutral point of rock-socketed pile foundations under varying pile diameters. Based on the effective stress method, the formula for negative skin friction of pile foundations after creep stabilization in high-fill sites, which is absent in design codes, is corrected. The results demonstrate that pile shaft displacement lags behind the settlement of surrounding backfilled soil; changes in pile diameter induce significant settlement and internal force increments in the pile foundation; the axial force in the pile shaft after creep stabilization differs substantially from that without creep. The negative skin friction coefficient of pile foundations after creep stabilization in high-fill sites is approximately 0.30~0.61 times the pile diameter, leading to a more pronounced reduction in pile bearing capacity that, in severe cases, endangers the long-term safety performance of pile foundations in high backfill sites.

Full Text

Preamble

The source document is severely corrupted and contains no recoverable academic content beyond basic section structure. The majority of the input consists of PDF extraction artifacts, CID font mapping errors, and garbled characters that

cannot be meaningfully translated. Only the section heading "## Preamble" was identifiable as valid structural markup.

Note: Figure translations are in progress. See original paper for figures.