The Effect of Spatial Variability on Axial Pile Design of Closed Ended Piles in Sand

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Abstract : While significant improvements have been made in axial pile design methods over recent years, the influence of soils natural variability has not been adequately accounted for within them. Soil variability is a crucial parameter to consider as it can account for large variations in pile capacity across the same site. This paper seeks to address this knowledge deficit, by demonstrating how soil spatial variability can be accommodated into existing cone penetration test (CPT) based pile design methods, in the form of layered non-homogeneous random fields. These random fields model the scope of a given property's variance and define how it varies spatially. A Monte Carlo analysis of the pile will be performed taking into account parameter uncertainty and spatial variability, described using the measured scales of fluctuation. The results will be discussed in light of Eurocode 7 and the effect of spatial averaging on design capacities will be analysed.

Keywords : pile axial design, reliability, spatial variability, CPT

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