A quantitative analysis of the spatial effects of retaining structure for slender foundation pits

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Abstract. The design methods of retaining structures for hollow slender foundation pits based on classical earth pressure theories such as Rankine's and Coulomb's theories have inevitably drawn fierce criticization for their obvious deviation in describing the behaviour of the retaining structures due to their incapable of considering spatial effects of the structures. Firstly, the spatial effects are for the first time defined by a set of variable ratios such as deformation ratio, earth pressure ratio and ratios of internal forces of a retaining structure after an overall examination of the factors influencing the spatial effects. Secondly, nonlinear finite element analyses and laboratory model tests of spatial effects of retaining structures for slender foundation pits in sands were conducted both in engineering and/or small model scales. The deformation ratio, earth pressure ratio and ratios of internal forces of the retaining structures obtained from the computation data and tests data vary significantly with the process of excavation, and show a strong tendency in distribution at different positions, which are of basic distinction from general rules based on classic earth pressure theories. These results are of importance in developing analysis and design methods that make implantation of spatial effects into in practice.

1. Introduction
2. Conclusions

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References