Bearing capacity and load transfer mechanism of a static drill rooted nodular pile in soft soil areas

软土地区静态深钻结节桩的承载力和载荷传递机理研究

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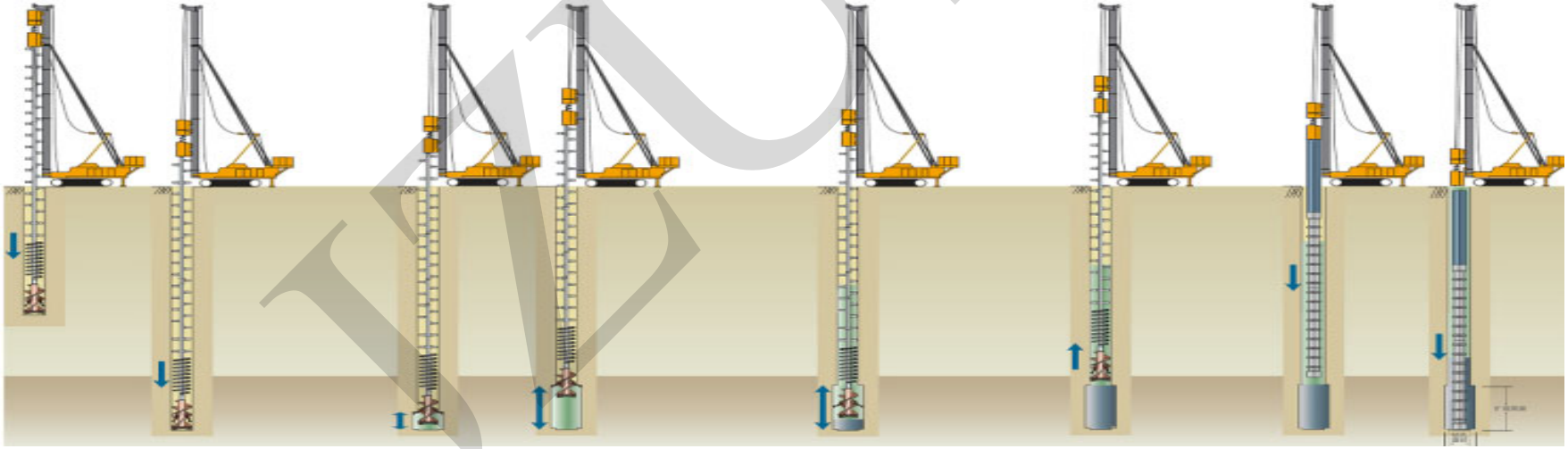
Main content

The static drill rooted nodular pile is a new pile foundation consisting of precast nodular pile and the surrounding cemented soil. This composite pile has a relatively high bearing capacity and is environmental friendly. In this paper, results of the field tests and the ABAQUS simulation are used to analysis the load transfer mechanism of the nodular pile.

Construction process of the nodular pile



Drilling | Expanding at the pile tip | Grouting at the pile tip | Grouting along the pile | Put the pile into the hole

Field tests of the nodular piles

Destructive field tests of four static drill rooted nodular piles and two bored piles

Field test of the static drill rooted nodular pile which is attached with strain gauges

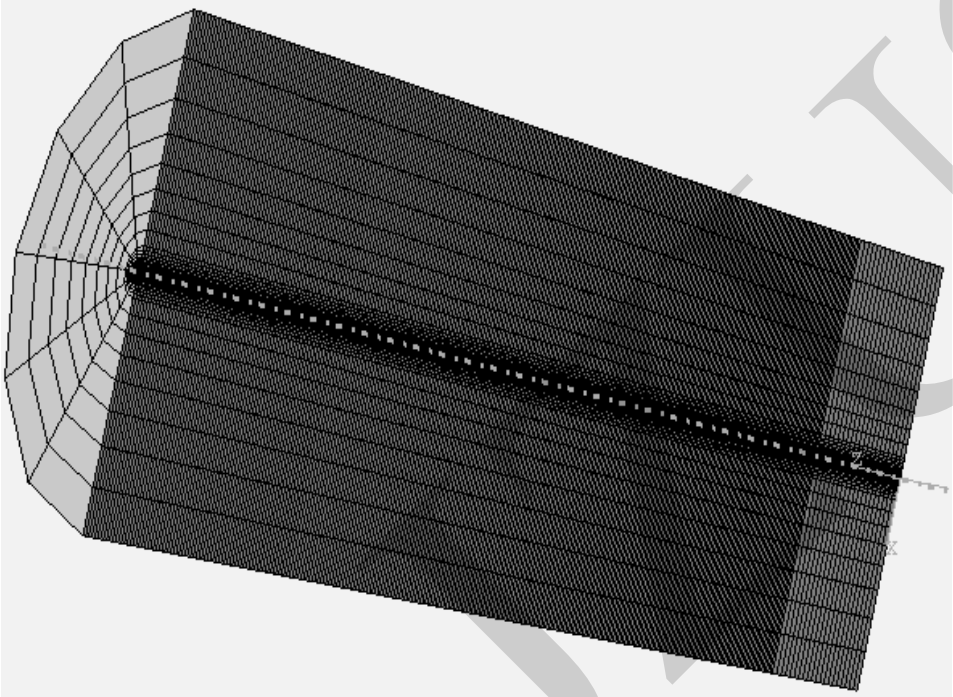
According to the field tests of the static drill rooted nodular piles and the bored piles, the bearing capacity of the nodular pile is about 8% to 10% higher than that of the bored pile in the soft soil areas.

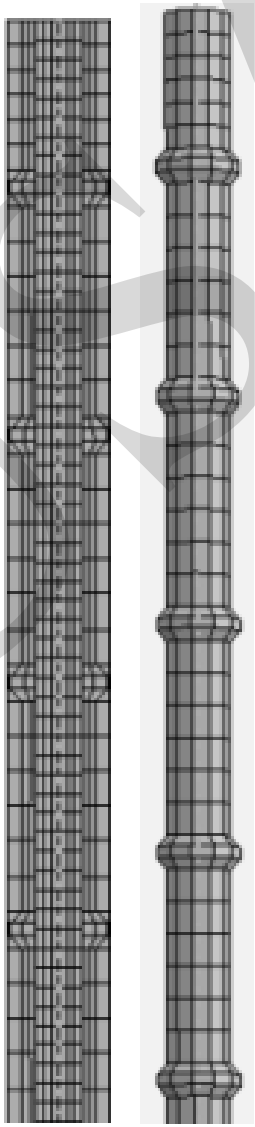
From the field tests , the skin friction of the static drill rooted pile is about 1.05–1.10 times higher than that of the bored pile in the soft soil layer.

Statistics from the primary applications in some places of the deep soft soil layers in China show that the cost can be decreased by 10% using this nodular pile compared to the bored piles.

Finite element method simulation

Sketch of the model





Result of the ABAQUS simulation

The bearing capacity of the nodular pile is higher than that of the bored pile.

The settlement of the static drill rooted nodular pile is controlled by the precast nodular pile.

The nodes on the nodular pile play an important role during the load transfer process.