

Postprint of Study on Flexural Performance of Grouted Steel Pipe Micropiles

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Abstract

To investigate the flexural performance of grouted micro steel pipe piles, pure bending tests were conducted on 12 specimens with different steel pipe diameters, wall thicknesses, and mortar strengths using an orthogonal experimental design. Based on the test results, an expression for ultimate flexural bearing capacity was proposed, and a model was established using the finite element software ANSYS for verification. The results show that: the entire bending process of grouted micro steel pipe piles can be divided into three stages, namely, the elastic stage, elastoplastic stage, and strengthening stage; the sensitivity ranking of ultimate load for grouted micro steel pipes is steel pipe diameter > steel pipe wall thickness > mortar strength grade; the ultimate flexural bearing capacities calculated by different codes show significant differences from the test results; the expression for ultimate flexural bearing capacity of grouted micro steel pipe piles proposed in this study shows good agreement with the test results, with the flexural bearing capacity of the steel pipe accounting for approximately 78% of the total flexural bearing capacity of the grouted micro steel pipe pile, and the mortar inside the pipe accounting for approximately 22%; finite element simulation results demonstrate that the mortar inside the pipe significantly enhances the flexural performance of micro steel pipe piles, thereby verifying the correctness of the proposed expression for flexural bearing capacity of grouted micro steel pipe piles.

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