

论文

盾构机下穿桩基施工对单桩承载力影响的数值研究

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摘要:

在大型有限差分软件FLAC3D平台上进行二次开发, 利用内嵌FISH语言编程, 对盾构隧道动态施工过程中上部基桩承载力的影响进行数值仿真模拟, 模型考虑盾构前方土仓压力、盾尾同步注浆、注浆凝结和未凝结两种状态以及衬砌管片施加等施工参数。从桩侧摩阻力、桩端阻力等方面对盾构开挖过程中上部基桩承载力进行分析, 以及土仓压力变化对承载力影响。研究表明: 随着隧道开挖, 桩侧摩阻力、桩端阻力发生复杂变化, 桩底部出现负摩擦力, 桩端轴力为拉力, 对基桩竖向极限承载力有一定的影响; 并且开挖面距桩轴线不同位置, 土仓压力对基桩竖向极限承载力影响不同。

关键词: 盾构隧道, 土仓压力, 注浆压力, 数值模拟, 桩侧摩擦力, 竖向极限承载力

NUMERICAL SIMULATION OF EFFECT OF SHIELD TUNNELING ON BEARING CAPACITY OF SINGLE PILE

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Abstract:

On the basis of the finite difference software -FLAC3D, this paper compiles program using its FISH language to simulate the effects of shield tunneling on bearing capacity of a single pile. Considering the soil pressure in the soil chamber, grouting in the shield tail, and grouting with two phases of clotted and not clotted states. The bearing capacity of a single pile is analyzed during shield tunneling. Influential factors to the single pile by shield tunneling consist of skin-friction resistance and tip resistance of a pile. The influence on the pile bearing capacity is also analyzed as changing of propellant force of the face of excavation. It shows that negative skin-friction of pile would occur at the bottom of the pile, which could decrease the bearing capacity of the pile. The bearing capacity of a pile changes with varying the soil pressure in the soil chamber.

Keywords: Shield tunneling, Soil pressure, FLAC, FISH, Numerical simulation, Skin-friction resistance, Pile foundation, Ultimate bearing capacity

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