

深基坑圆形冻土帷幕力学性能模型试验研究

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摘要 利用自行设计加工的大型深基坑冻结模拟试验台, 进行大直径圆形冻土帷幕受力与变形的物理模拟试验, 获得深基坑开挖过程中圆形冻土帷幕水平位移随基坑开挖深度、开挖半径和冻土平均温度等影响因素的变化规律以及冻土帷幕暴露段水平变形规律。试验结果表明, 冻土帷幕水平位移随基坑开挖深度和开挖半径的增大而增大, 随冻土的平均温度降低而减小。随着开挖深度的增加, 冻土帷幕暴露段的水平变形不断增大, 且表现为“中间大、两头小”的变形特征; 不同温度下冻土帷幕的弹性变形占总变形量的比值不同, 由-4℃时的30%增加到-18℃时的90%。对几个影响因素进行综合分析可知, 冻土帷幕水平变形的主要影响因素是基坑半径和开挖深度, 而帷幕平均温度、厚度及施工段高的影响相对较小。

关键词

[土力学](#); [深基坑](#); [冻土帷幕](#); [位移](#); [模型试验研究](#)

分类号

MODEL EXPERIMENTAL STUDY ON MECHANICAL CHARACTERISTICS OF ROUND-SHAPED FROZEN SOIL WALL IN DEEP PIT

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Abstract

In order to understand the artificial freezing technology employed in the deep pit, a physical model test of stress and deformation of large diameter round-shaped frozen soil wall was carried out on a self-developed large test rig. The laws were obtained among the horizontal displacement of the frozen soil wall and the factors of the excavation depth, frozen soil wall diameter, and the average of temperature of frozen soil. The changing laws in the exposure of frozen soil wall were also obtained. The results show that the horizontal displacement of wall increases as the depth and diameter increase during excavation, but decrease as the average of temperature decreases. The horizontal displacement of the exposure of frozen soil wall increases as the excavation depth increases, and the characteristics of the larger deformation in the center and the smaller ones in both sides were obtained. There are the different ratios of elastic displacement to the total displacement under different temperatures, and it increases from 30%(-4℃) to 90%(-18℃). The analysis indicates that the diameter and depth of foundation pit are the major factors that affect horizontal displacement of the frozen soil wall, and the effects of average of temperature, wall thickness and excavation height are comparatively smaller.

Key words [soil mechanics](#); [deep pit](#); [frozen soil wall](#); [displacement](#); [model experimental study](#)

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