Postprint: Study on Joint Type Selection for Ultra-Deep and Ultra-Thick Diaphragm Walls under High Water Pressure

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Abstract

During the trenching process of ultra-deep diaphragm walls encountering water-rich geological conditions, defects such as low construction efficiency, high construction costs, and severe water leakage significantly impact subsequent foundation pit excavation and stability, as well as main structure quality. Focusing on diaphragm wall construction under complex geological conditions at Dongdaqiao Station of Beijing Rail Transit Line 28, this paper analyzes the technological characteristics of steel joints and milling joints, proposes a mechanism for joint water leakage, summarizes the theoretical basis for joint type selection, and addresses the challenge of selecting joint forms due to low efficiency and high cost of joint construction under water-rich geological conditions, along with unclear waterproofing effects at joint locations.

Full Text

Research on Joint Selection of Ultra-Deep, Ultra-Thick Diaphragm Walls Under High Water Pressure

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Abstract

The construction of ultra-deep diaphragm walls in water-rich geological conditions is plagued by low efficiency, high costs, and severe water leakage, which significantly compromise subsequent excavation, foundation pit stability, and main structure quality. Focusing on the diaphragm wall construction at Dongdaqiao Station of Beijing Rail Transit Line 28 under complex geological conditions, this study analyzes the technical characteristics of steel joints and milling

joints, proposes a mechanism for joint water leakage, and summarizes the theoretical basis for joint selection. This approach resolves the challenging problem of joint type selection in water-rich strata, where decision-making has been hindered by uncertainties regarding construction efficiency, cost, and waterproofing performance.

Keywords: diaphragm wall, water-rich geological conditions, steel joint, milling joint, selection

Note: Figure translations are in progress. See original paper for figures.