

Analysis On Water Migration In Freeze-Thaw Process Of Composite Lining Canal In Seasonal Frozen Soil Area

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Abstract: In order to quantify the migration rule of water in composite lining canal foundation soil during the freeze-thaw process, the outdoor prototype test is performed to prove the change rules of water in different positions and depths of the rigidflexible mixed composite lining canal foundation during the whole freeze-thaw cycle. The prototype observation test shows that during the freezing period, the water content within the 0~80cm depth of the canal foundation soil increases with the depth, and that within the depth of 80~160cm decreases gradually with the depth. In the freezing period, water accumulates in the depth of 60 ~ 80cm, with a maximum water transfer amount of +13.2%, which occurs at the canal bottom. In the thawing period, the maximum water content also occurs at the canal bottom, with a maximum water transfer amount of -11.0%. Through the laboratory test of soil samples, the water migration development and change rules of the canal foundation soil, under different moisture contents and temperature gradients are studied in unilateral pattern. In the case of the same top plate control temperature, soil samples with similar initial water contents have similar water transfer amounts. The samples with higher initial water content have higher water transfer amount, with higher water accumulation, normally accumulating in the depth of 16~18cm. The results indicate that high water contents make it easy to gather water in soil samples during the freezing period.

Keywords: Composite lining canal, freeze-thaw test, water migration, water accumulation

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