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农业灌溉水渠防渗土工膜的温度敏感性及其张拉力评价

Experiment and evaluation on temperature sensitivities and tensile forces of anti-seepage geomembrane of farmland irrigation canal

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中文关键词: [渗漏](#) [土工膜](#) [温度应力](#) [膨胀](#) [张拉力](#) [有限元分析](#) [防渗土工膜](#) [线膨胀系数](#)

英文关键词: [seepage](#) [geomembranes](#) [thermal stress](#) [expansion](#) [tensile stress](#) [finite element analysis](#) [anti-seepage geomembrane](#) [expansion coefficient](#)

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中文摘要:

为了了解农用水渠中防渗土工膜的温度敏感性, 针对农用水渠防渗土工膜的变形和温度应力问题进行研究, 采用力传感器、热电偶和位移传感器等对温度变化后的防渗土工膜端部张拉力进行了测量, 提出温度变化引起的防渗土工膜端部张拉力评价方法。试验结果表明: 外界环境温度变化对防渗土工膜端部张拉力有较大影响, 特别是高密度聚乙烯防渗土工膜; 铺设无纺布能有效降低防渗土工膜的温度; 温度变化较大时, 防渗土工膜产生较大变形, 最大变形超过60 mm。基于极限平衡理论, 考虑弹性模量与温度的关系, 提出了温度变化引起的防渗土工膜端部张拉力评价方法, 并与试验结果进行了比较, 结果表明所提评价方法能有效评价温度变化引起的防渗土工膜张拉力, 对实际工程有一定的参考价值。

英文摘要:

In order to understand the temperature sensitivity of anti-seepage geomembrane, the experimental study and analysis of the thermal stress and deformation were conducted for anti-seepage geomembrane of farmland irrigation canal. The tensile force at the fixed end of anti-seepage geomembrane was measured by loadcell, thermocouple, and displacement gauge with variation in temperature. Experimental results indicated that the temperature change had significant effect on the tensile force at the fixed end, especially for the HDPE anti-seepage geomembrane; The temperature of anti-seepage geomembrane could be effectively reduced when the non-woven geotextile was used between the anti-seepage geomembrane and the protective layer; The large deformation occurred with variations in temperature, the max displacement could reach 60 mm. Based on limit equilibrium theory, evaluation methods on the tensile forces caused by variation in temperature of anti-seepage geomembrane was proposed, the evaluation results considering the relationship between elastic modulus and temperature were in agreement with the experiment. The method proposed can effectively estimates tensile force of anti-seepage geomembrane with temperature variation. The test results can provide a certain reference for the engineering practice.

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