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页] [关闭]

重大工程实践

黄土斜(边)坡表层冻结效应及其稳定响应

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摘要:

中国黄土分布于季节性冻土区,年复一年的冻融作用对具有特殊结构黄土斜(边)坡的稳定性有很大影响,促发了大量黄土斜(边)坡灾害,制约着地区经济发展。深入研究冻融作用机理,对减轻黄土斜(边)坡灾害有重要的理论和现实意义。针对黄土斜(边)坡灾害及冻融作用特点,利用表层冻结温度场数值模拟、冻结前后地下水聚集模型分析及实例验证分析等方法、手段,揭示边坡表层土体冻结过程、坡体内地下水集聚过程,探讨黄土斜(边)坡表层冻结效应及其稳定响应。结果是:(1)表层冻结作用由表及里进行,大约在冻结3个月后达到当地最大冻深;(2)以简化的地下水聚集模型分析,推导得到坡体内地下水浸润线方程;(3)冻结滞水作用可使黄土斜(边)坡稳定性降低约25%。

关键词: 黄土斜(边)坡 冻结效应 地下水聚集 浸润线 稳定响应

FREEZING EFFECT ON LOESS SLOPE AND STABILITY RESPONSE

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Abstract:

Loess in China is distributed in the seasonal frozen soil area. Effect of Freezing-thawing has greatly influenced on the stability of loess slope which has

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special structure,impel a large number of loess hazards.Study on Freezing-thawing mechanism,has some important theoretical and practical significance to reduce loess slope hazards.According to the characters of loess slope and Freezing-thawing,use numerical simulation of the surface freezing temperature,analysis groundwater accumulation model before and after freezing,and analysis example,reveal freezing process on surface soil of slope and water accumulation,discuss the Freezing effect on slope surface and response on stability.The result is: (1) The Freezing effect begin from surface to inner,reach maximum depth about 3 months after the freezing; (2)Analysis the simple groundwater accumulation model,derive the equation of groundwater saturation line; (3)The stability of loess slope will reduce about 25% by the effect of freezing-thawing.

Keywords: Loess Slope Effect of Freezing  
Groundwater Accumulation Saturation Line  
Stability Response

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