岩石力学与工程学报 2006 25 (2006-S2): 3794 ISSN: 1000-6915 CN: 42-1397/O3

堤坝集中渗漏温度场探测模型及数值试验

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收稿日期 2005-12-14 修回日期 2006-4-21 网络版发布日期 2007-1-30 接受日期 2005-12-14

摘要 为确定堤坝集中渗漏通道的位置和性质，在反分析理论的基础上，建立齐次边界条件下的各向同性土体热传导模型和复杂边界条件下的渗流传热模型；求解简化边界条件后的解析解，对方程解进行变量转换，把渗漏通道位置和其他参数作为未知变量，建立反分析目标方程，指出实现回归优化的多条途径。为了验证其有效性，利用有限元软件设计数值试验，参照温度场特征，对两种主要模型不同探测线、最低温水平面及综合数据进行回归分析对比。工程实例优化结果表明，利用温度场进行集中渗漏探测是有效的方法。

关键词 水利工程；温度场；数值试验；渗流；回归分析；优化

分类号

MODEL FOR DETECTING OF CONCENTRATED LEAKAGE IN DAM AND DYKE AND ITS NUMERICAL EXPERIMENT

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Abstract

Concentration leakage is important cause of dam and dyke safety，so leakage intensity，scope and position of leakage passage need to be determined in order to intercept leakage in dyke and dam. In this paper，heat conduction model with homogeneous boundary condition in isotopic soil and heat conduction model including seepage are set up firstly. Then the characteristics of temperature field of those models are presented. Analytic solutions are given and equations are transferred with different variables. The position of the concentrated leakage passage and other parameters are treated as unknown parameters. Optimization target equations are established and different regression methods are referred to. At last，numerical experiments are carried out，and various regressions are done. The result indicates that this detecting method is very effective.

Key words hydraulic engineering；temperature field；numerical experiment；seepage；regression analysis；optimization

DOI:

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