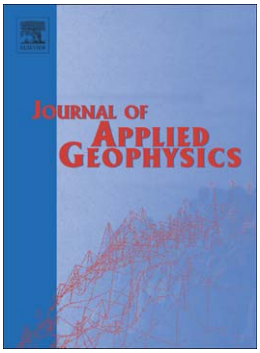

Electric-field response based experimental investigation of unsaturated soil slope seepage

Jishi Geng, Qiang Sun, Yuchun Zhang, Changgen Yan, Weiqiang Zhang

PII: S0926-9851(17)30065-4
DOI: doi:10.1016/j.jappgeo.2017.01.023
Reference: APPGEO 3193

To appear in: *Journal of Applied Geophysics*

Received date: 7 August 2016
Revised date: 13 January 2017
Accepted date: 16 January 2017

Please cite this article as: Geng, Jishi, Sun, Qiang, Zhang, Yuchun, Yan, Changgen, Zhang, Weiqiang, Electric-field response based experimental investigation of unsaturated soil slope seepage, *Journal of Applied Geophysics* (2017), doi:10.1016/j.jappgeo.2017.01.023

Electric-field response based experimental investigation of unsaturated soil slope seepage

Jishi Geng[1(✉)], Qiang Sun[1], Yuchun Zhang[2(✉)], Changgen Yan[3], Weiqiang Zhang[1]

[1]School of Resources and Geosciences, China University of Mining and Technology, Xuzhou, Jiangsu Province 221116, P.R. China;

[2]Faculty of Geosciences and Environmental Engineering, Southwest Jiaotong University, Chengdu, Sichuan Province 611756, P.R. China;

[3]School of Highway, Chang' an University, Xi' an, Shanxi Province 710064, P.R. China;

Corresponding author: Tel: +86-516-83591015; +86 13438102955; E-mail address: 1050330609@qq.com (J. Geng); zycfire@swjtu.cn (Y. Zhang)

Abstract: Rainfall is one of the important factors causing the failure of slope, such as the occurrence of transverse cracks and localized slumps. The process of rainfall seepage was studied with an indoor soil slope model based on the Network Parallel Electrical Method. The responses of geoelectric-field parameters were analyzed to infer the evolution process of rainfall seepage path. The variations of geoelectric-field parameters also contribute to our understanding of the behavior of groundwater seepage. The results show that the seepage velocity and seepage position of groundwater can be obtained according to the exciting current and primary field potential response characteristics of seepage field. The primary field potential, exciting current, spontaneous potential and apparent resistivity are sensitive to the water flow. When the position of the seepage surface reaches a certain electrode, the spontaneous potential, primary field potential and exciting current rapidly increase, while the apparent resistivity decreases gradually. The result of apparent resistivity can reflect the variation of the water content in the 3D structural soil slope and the position of infiltration surface. The results of study can provide the theoretical basis for studying the behavior of moisture flow in soil slope under rainfall condition.

Keywords: unsaturated soil slope; rainfall seepage; geoelectric-field response

1. Introduction

Rainfall usually induces a large number of geological disasters such as landslides, collapse as well as debris flow in the mountain areas, which may inflict heavy casualties and property losses. Analysis of water seepage caused by rainfall in soil slope is important to identify the risk of the