

NUMERICAL ANALYSIS OF THE INFLUENCE OF CAVITIES ON SEEPAGE THROUGH EARTH DAMS

H. AIATEYA¹, A. AHANGAR ASR²

Computing Science and Engineering, University of Salford, Greater Manchester, United Kingdom
H.Aiateya@edu.salford.ac.uk

Computing Science and Engineering, University of Salford Greater Manchester, United Kingdom
A.AhangarAsr@salford.ac.uk

Key Words: *Earth Dams, Seepage Analysis, Cavities, Finite Element, PLAXIS 2D.*

Seepage through earth dams is one of the main reasons of sudden earth dam failures through weakening the earth dam structure and the piping phenomenon. Cavities existence under the hydraulic structures can lead to heavy structural financial damages and financial losses as well as possibly humanitarian catastrophes. This research presents a numerical investigation into the effect of cavities existence on seepage through earth dams considering rapid drawdown conditions. The aim of present investigation is to simulate the effect of varying location of cavities in horizontal and vertical directions on seepage through earth dams. A series of 2D finite element models were developed using PLAXIS 2D software. A single cavity in various locations horizontally and vertically in subsoil of upstream and downstream slopes was considered in these simulations. The results of numerical simulations indicated that the cavities presence in subsoil of upstream face influences seepage through earth dam dramatically where the values of flow rate rises considerably. The numerical outcomes also showed that varying location of cavities in horizontal direction is more influential than its location alterations in the vertical direction where the flow rate variations are considerably smaller under the effect of the cavities.