Explicit solutions for seepage infiltrating into a porous earth dam due to precipitation

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Abstract

Steady two-dimensional gravity-driven seepage in homogeneous porous lumps is studied with the help of conformal mappings and boundary value problem technique. The Terzaghi flow pattern for a trapezoidal dam exposed to a heavy rainstorm is analysed. For a semi-circular massif, the influence of impervious bed inclination is studied. Recharge-discharge distributions, hinge points, gradients along the lump contour as well as the total flow rate exhibiting water-bearing capacity of the unit are found in explicit form. Generalizations for non-isobaric boundary conditions are discussed.

Keywords

Boundary value problems, Conformal mapping, Hydraulic gradient, Recharge-discharge, Seepage