

## AN ITERATIVE SERIES SOLUTION APPROACH FOR SOLVING THE FREE-BOUNDARY CONDITION IN GROUNDWATER FLOW SYSTEMS

Sanders Wong\*, James R. Craig\* and W. Wayne Read†

\*Department of Civil & Environmental Engineering  
University of Waterloo, Waterloo, ON, Canada  
e-mail: s38wong@uwaterloo.ca, jrcraig@uwaterloo.ca  
web page:<http://www.civil.uwaterloo.ca/jrcraig/>

†Department of Mathematics & Statistics  
James Cook University, Townsville, QLD, Australia  
e-mail: wayne.read@jcu.edu.au

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**Summary.** In this paper, a two-dimensional analytic series solution for groundwater flow with a free water table condition is derived and demonstrated on a two-layer unconfined aquifer with complex (i.e., natural) stratigraphy. The vertical side and bottom boundaries of the model domain are impermeable, and the water table is a free-boundary condition governed by both Dirichlet and Neumann conditions. Unlike previous investigations, the problem is complicated by the possible intersection of the water table with interfaces between different materials. This challenge can be overcome by intelligently revising the analytic series solution approach previously developed by the authors. The series coefficients are calculated through a least-squares method which minimizes errors. Test cases are used to demonstrate the effects of both system geometry and lower aquifer conductivity upon the shape of the water table surface.