

# Dupuit or Not Dupuit? That's the question

**Mark Bakker**

Water Resources Section, Civil Engineering and Geosciences, Delft University of Technology, Delft, The Netherlands

## **EXTENDED ABSTRACT**

The basic idea behind the Dupuit approximation is that the head is approximated as hydrostatic within an aquifer. The main advantage of this approximation is that it reduces the spatial dimensions by one; the head at a certain elevation can be solved as a function of the two horizontal coordinates, and the head at any other elevation can be computed from the hydrostatic conditions. The modern interpretation of the Dupuit approximation is that 'the resistance to flow in the vertical direction is neglected'. A three-dimensional flow field and three-dimensional pathlines may be computed under this interpretation, as vertical flow within an aquifer is governed by continuity rather than by a head gradient.

The Dupuit approximation is often reasonable in cases of regional flow where flow is predominantly horizontal, but it remains an approximation. In this presentation, the accuracy of the Dupuit approximation is evaluated for a number of cases of interface flow in coastal aquifers, including the depth and shape of the interface, the size of the outflow face along the ocean bottom, and the effect of vertical anisotropy.

**Contact Information:** Mark Bakker, Water Resources Section, Civil Engineering and Geosciences, Delft University of Technology, Delft, The Netherlands, Phone: +31 15 2783714, Email: [mark.bakker@tudelft.nl](mailto:mark.bakker@tudelft.nl)