

Groundwater response to tidal fluctuations in a leaky confined coastal aquifer with finite length

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We derive an analytical solution to calculate the groundwater response to tidal fluctuations in a horizontally-finite, leaky, coastal aquifer system. Our solution represents a generalized formulation that encompasses previous results as special cases. Based on the solution, we investigate the joint effects of the leakage and inland aquifer length on the behavior of the groundwater level fluctuation. We show that neglecting the finite-length effect may lead to significant errors in parameter estimations. Moreover, the range where the finite-length effect dominates is quantitatively determined by a characteristic dimensionless parameter. Finally, we demonstrate the usage of the proposed solution in calculating hydraulic properties through an application to a field experiment conducted at the Seine River estuary, France.

Keywords: Coastal aquifer, Analytical solution, Leakage, Tidal effect

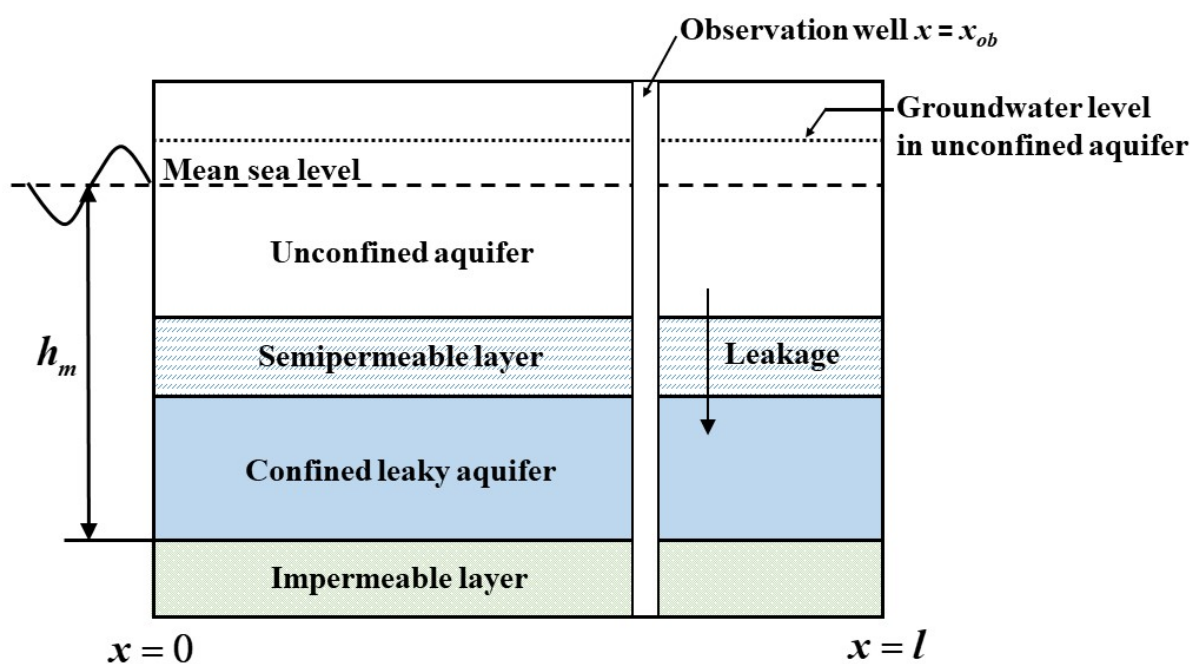


Figure 1 Schematic diagram of the leaky confined aquifer system in coastal areas