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Experimental and Numerical Investigation on Saltwater Intrusion into Unconfined Coastal Aquifers

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Abstract

Steady and unsteady experimental and numerical simulations are carried out in this paper to investigate saltwater intrusion mechanism into unconfined coastal aquifer. Laboratory results are compared to dispersive SEAWAT model to assess the applicability of numerical simulation. The dispersive SEAWAT model predicts salinities reasonably well comparing with sand-tank observation but it over predicts salt wedge toe position. Time reaching to steady state was almost equal in both physical and numerical modeling. In order to compare the mixing zone thickness, 5% and 95% salinity contours were also compared against laboratory data. The numerical results indicated partially wide mixing zone that is not observed in the experiments. Longitudinal dispersivity has been calibrated in the model to minimize the mixing zone thickness. Flow velocity components are also computed in this study by simple Darcy's law and the freshwater and saltwater streamlines are depicted to visualize the flow adjacent the salt wedge and to observe the freshwater/saltwater movement toward exit point.

Keywords: *Saltwater intrusion, Coastal aquifer, Sand tank, Freshwater, SEAWAT model.*