

## **Abstract**

The fundamental effect of the change in saltwater level on velocity distribution is important in understanding the effect of tidal fluctuation in coastal aquifers. This study applied the laboratory experiments using the image analysis method and the numerical model to study the effect of varying the saltwater level on velocity distribution in coastal aquifers. It was established that the change in saltwater level affected the velocity distribution, such that; the velocity at the interface was more than twice the one in freshwater. In addition the tracer in the freshwater zone moved to the intersection between the saltwater level and the coastal slope while the tracer in the saltwater zone went along to the shape of the interface. The numerical model revealed that the drastic high velocities at the interface were due to the great buoyancy effects resulting from the varying fluid density between the saltwater and freshwater in the transition zone. The velocity in the freshwater zone was proportional to the global hydraulic gradient while in the saltwater zone, the velocity was inversely proportional to the global hydraulic gradient. Therefore the changes in saltwater level influence velocity distribution in coastal aquifers.