Abstract

Residents of coastal areas consume water from boreholes at the absence of the drinking water distribution network. This borehole water generally contains pollutants of saline origin due to the proximity of the sea, which are responsible of many diseases among the inhabitants of the coastal zones. In these areas, seawater moves progressively towards freshwater and a transition zone develops between them. The objective of this article is to study the spatio-temporal variation of the sea salt concentration and the impact of the variable dispersion coefficient as a function of the depth (x) in the coastal zones. For this aim, the linear advection-dispersion equation was solved analytically by the Laplace transform method and numerically by the fourth order Runge Kutta method (RK4), to determine the spatio-temporal concentration of the salinity of groundwater in coastal areas. From the analysis of the results obtained by using Matlab coding,it has been found that the pollutant increases with time in drinking water points located in coastal areas and decreases when moving away from the source point of pollutants. by tolerating 10 % of the initial concentration of pollutants in groundwater, the minimum distance allowed for the implantation of a drinking water point with respect to the input of the coastal matrix is of the order of 27 km for the non-variable dispersion coefficient with the depth (x), on the other hand, in the case of a variable dispersion, the minimum distance allowed for implantation is rather 30 km. This shows that the concentration of salinity decreases more slowly with the variable dispersion coefficient as a function of the depth in the coastal subsoil.

***Keywords*:** salinity, advection, dispersion, Laplace, Runge Kutta