

Geol 4822

Assignment 8

We wish to simulate temporal changes in the confined aquifer heads between two reservoirs (shown below). Assume the aquifer is 100 m long, has a T of $0.02 \text{ m}^2 \text{ min}^{-1}$, and a storage coefficient of 0.002 . The head is initially uniform at 16 m (i.e., the initial condition is $h|_{x,0} = 16 \text{ m}$) and drops to 11 m at $x = 100$ at time 0 (i.e., the boundary conditions are $h|_{0,t} = 16 \text{ m}$ and $h|_{100,t} = 11 \text{ m}$).

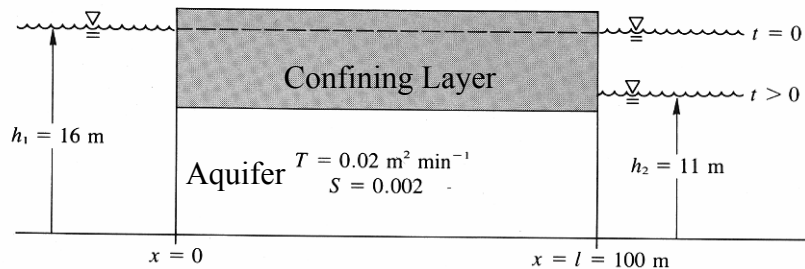


Figure 1. Wang and Anderson, 1982. Introduction to Groundwater Modeling. W. H. Freeman and Company, San Francisco. 237 pp.

1. Create a spreadsheet to solve the 1-D transient ground water flow equation using the explicit method we discussed in class. Plot the distance versus head for at least 4 evenly-spaced times including one time near steady state. Plot time versus head for 1 point at $x = 50$. Indicate the value of the stability parameter in your solution.
2. Use MODFLOW2000 to solve the same problem.

Set the x and y spacing appropriately for the number of cells to get the correct total size. Similarly the thickness or K values must be adjusted so that $T = 0.02 \text{ m}^2 \text{ min}^{-1}$. Put in the correct storage coefficient.

Under Model, Modflow, Package Options, Basic, turn off the steady state option and change the time units to minutes and the space units to meters. Under Block Centered Flow, make the top (only) layer confined. Put in the initial heads. Then, under Model, Modflow, Stress Period Setup, choose appropriate duration and number of time steps bearing in mind the steady state is reached in about 400 minutes.

Under Model, Modflow2000, Stress Period Types, choose transient. Put in the boundary conditions. Uncheck the steady state option and provide the transient boundary heads.

Add a monitoring well that measures head as a function of time.