

CEE3430 Engineering Hydrology

Homework 4. Groundwater and Well Hydraulics

Date: 1/30/12

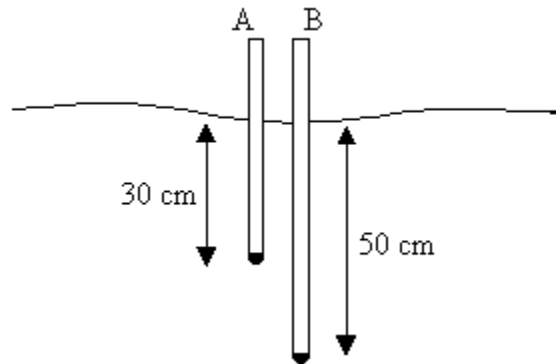
Due: 2/13/12

Objective. Gain experience applying solving problems related to groundwater flow and to wells.

1. A sandy loam has Brooks and Corey parameters (Mays Table 3.7.1 of $\lambda=0.35$, $h_b=19$ cm, $\theta_r=0.10$, $\phi=0.44$, $K_s=12.5$ cm/hr.

a) Plot graphs of matric potential and hydraulic conductivity for moisture content ranging between 0.2 and its upper bound.

b) Consider the following field situation. A and B are vertical tensiometers that measure pore water pressure (tension) relative to atmospheric pressure, at depths 30 and 50 cm below the ground.



Both tensiometers record a pressure of -4000 Pa (negative denoting suction here). Calculate the head gradient from A to B and the **flux (infiltration rate)**.

c) Now consider the following pressure measurements recorded at A and B. Negative denotes suction. Evaluate the pressure head at A and B, and total head at A and B using the surface as a datum. Indicate the direction of flow (i.e. downwards into the ground from A to B, or upwards from B to A).

Pressure at A (Pa) -4000

Pressure at B (Pa) -3000

ψ at A (cm)

ψ at B (cm)

Total head at A (cm)

Total head at B (cm)

Direction of flow

2. Mays 4.1.1
3. Mays 4.1.2. **This problem needs porosity for the confining layer. Any reasonable value is OK, but if you can use $n=0.5$ it makes grading easier.**
4. Mays 4.1.5
5. Mays 4.1.8
6. Mays 4.2.1
7. Mays 4.2.2
8. Mays 4.2.7
9. Mays 4.2.8