Surface Water Hydrology
Homework #5
Due on Monday, April 29, 2013

Problem 1. Tensiometers are installed at 0.5 m and 0.7 m above the water table in a uniform sandy soil with the moisture characteristic and hydraulic conductivity curves given in Fig.1 and Fig.2. One set of tensiometer readings indicates that the capillary pressure head at the first tensiometer (i.e., 0.5 m above the water table) is -0.42 m and at the second tensiometer (i.e., 0.7 m above the water table) is -0.55 m.

A. What is the direction of water movement between the two tensiometers?
B. Estimate the magnitude of the specific discharge between the two tensiometers.

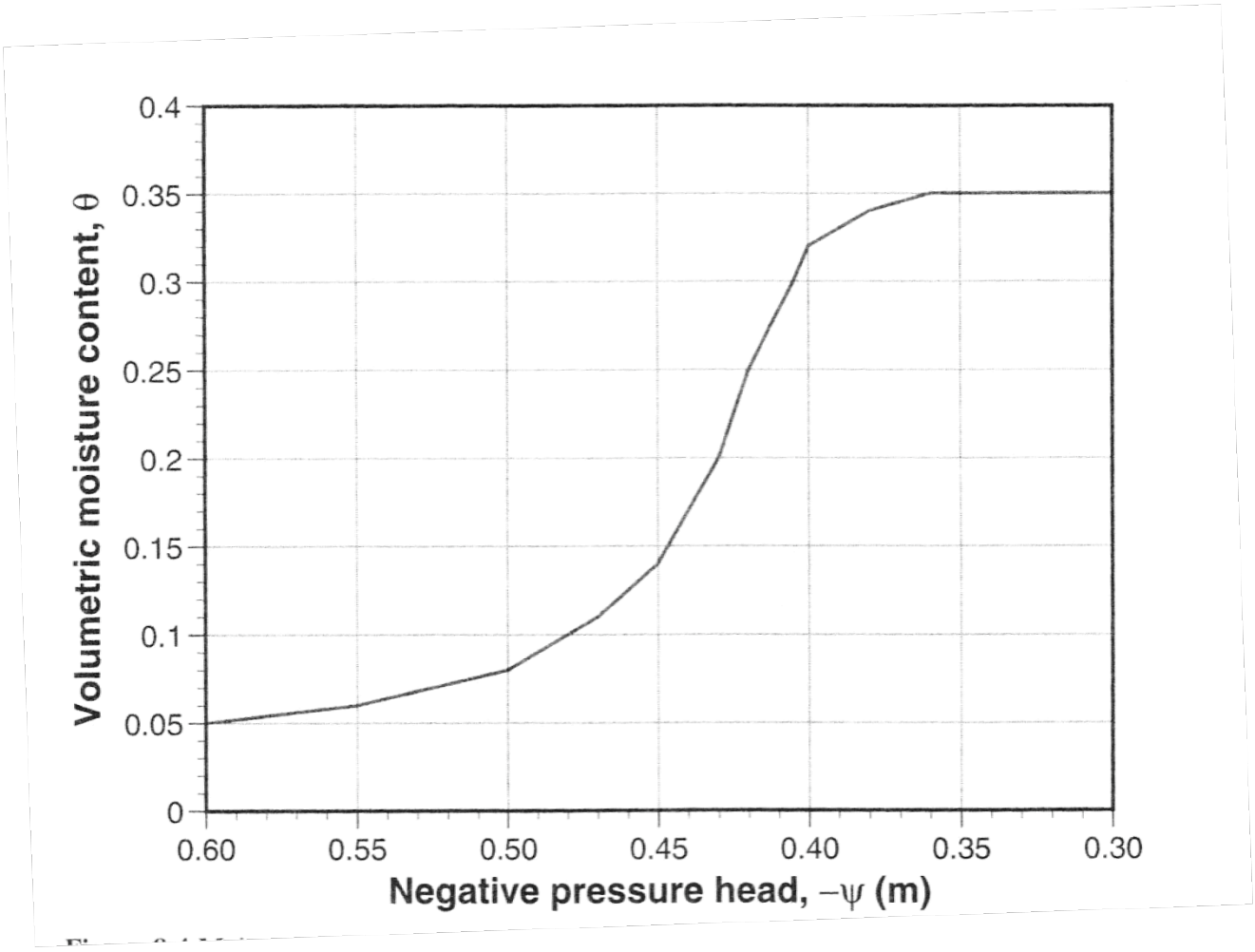

Fig.1

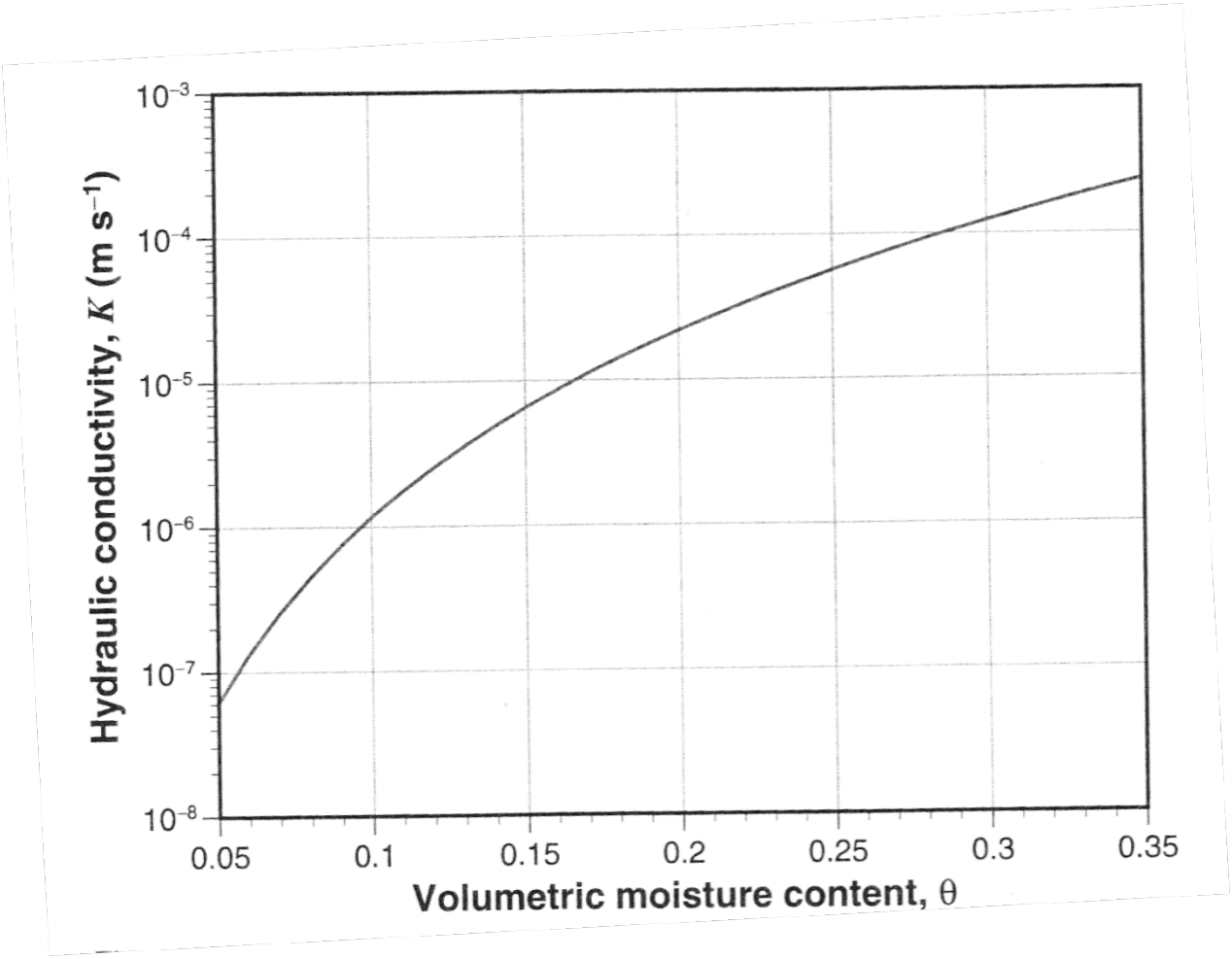

Fig.2

Problem 2. Assume that a wetting front movies into the sandy loam soil with the moisture characteristic given by:

$$\psi = -963.7 \times (\theta \times 100\%)^{-5}$$

where Ψ is the capillary pressure head in meters, θ is volumetric soil moisture content (no units, e.g., 0.3). The moisture content at the surface of the soil is held constant at 0.28. The underlying moisture content is at 0.10. If the saturated hydraulic conductivity for this soil is 4×10^{-6} m/s, estimate how long it will take the wetting front to move 1 m into the soil.