

53:030 Soil Mechanics
The University of Iowa
Department of Civil & Environmental Engineering
Supplement to Assignment #5

Fall 2003

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Question #1:

The potential head distribution in an infinite soil domain is given by $h(x, y) = 5x^2 - 5y^2$. Assume that the permeability for the soil is isotropic, and $k = 1.0$.

- a. At the point $(x, y) = (1, 1)$ what is the discharge velocity \mathbf{v} in the soil? (Provide the x and y components of the velocity vector.)
- b. Does the flow associated with the head distribution $h(x,y)$ satisfy the continuity equation $\nabla \cdot \mathbf{v} = 0$?

Question #2:

Consider the steady flow down the slope shown in Figure 1. The flow direction is parallel to the slope. For the geometry shown ($\alpha = 20^\circ$; $H = 4\text{m}$):

- a. Draw a flow-net over the flow domain.
- b. What is the magnitude i of the hydraulic gradient in the flow direction?
- c. What is the flow rate q in the permeable layer per unit width out of plane?
- d. What is the pore pressure along the sand/rock interface? (**Hint:** Use an equipotential line on your flow net to answer this question.)

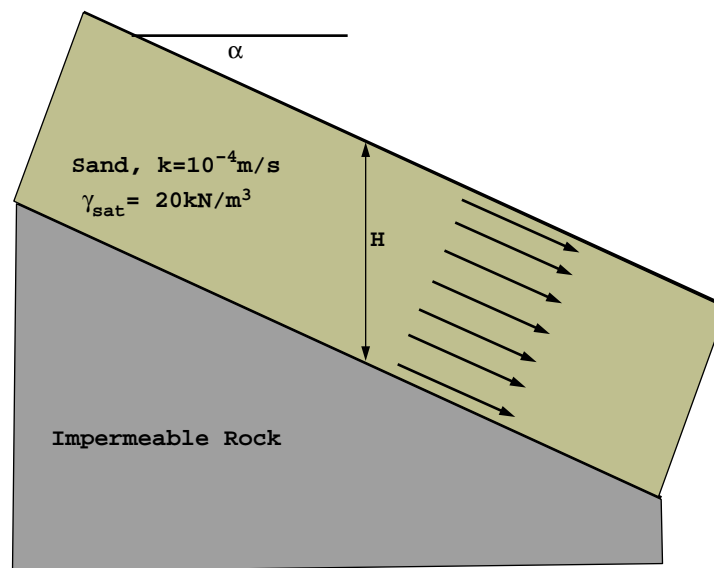


Figure 1. Seepage in a sand layer on an infinite uniform slope.