

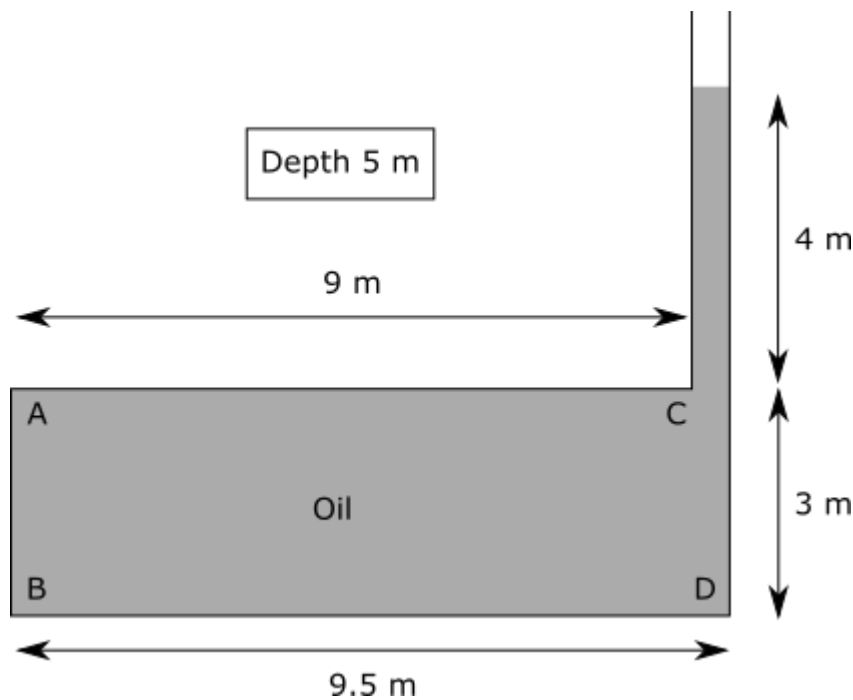


ECHE 225: Fall 2024

Homework #6: Fluids concepts, fluid statics

Due: October 17

1. [Chapter 10] For flow over a plate, the variation of velocity with vertical distance y from the plate is given as $u(y) = ay + by^2$ where a and b are constants. Obtain a relation for the wall shear stress in terms of a , b , and μ .
2. [Chapter 10] The surface tension of a liquid is to be measured using a liquid film suspended on a U-shaped wire frame with a 9 cm long movable side. If the force needed to move the wire is 0.045 N, determine the surface tension of this liquid in air.
3. [Chapter 11] The following 3 m x 9.5 m x 5 m tank shown is filled with oil of SG=0.8. Specific gravity (SG) is the ratio of the fluid density to the density of water. Depth here is the depth into the page.



Determine:

- (a) the magnitude and the location of the line of action of the resultant force acting on surface AB.
- (b) The pressure force acting on surface BD.
- (c) Will the force acting on surface BD equal the weight of oil in the tank? Find a relation.

Answers

1. μa
2. 0.25 N/m
3. (a) 5.64 m , (b) 2.6 MN , (c) $W = 1.2 \text{ MN}$