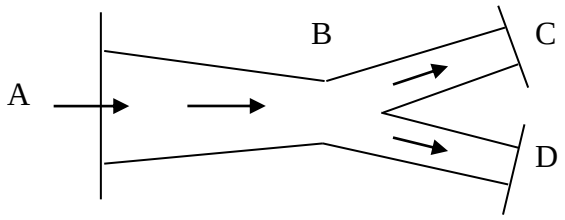
ET 6018: FLUID MECHANICS, 2019

Assignment 1

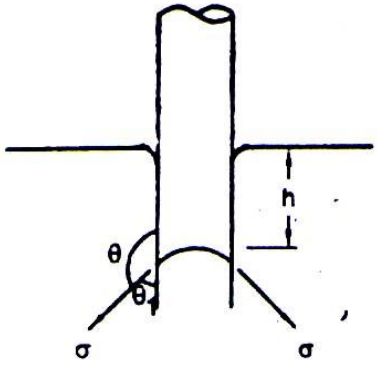
Q1. A pipe AB branches into two pipes C and D as shown in figure. The pipe has diameter of 0.45 m at A, 0.3 m at B, 0.2 m at C and 0.15 m at D. Find the discharge at A, if the velocity of water at A is 2 m/s. Also find out the velocities at B and D, if velocity at C is 4 m/s.



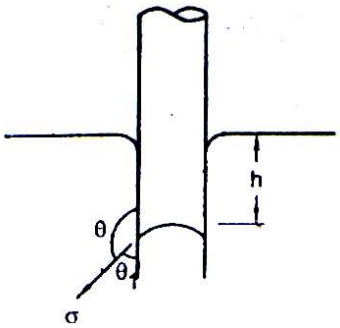
Q2. A stream function is given by the expression: $\psi = 2x^2 - y^3$. Find the components of the velocity, as well as the resultant velocity at a point *P* (3,1).

Assignment 2

Q1. Calculate the distance h for mercury in the capillary glass tube of 3.5 *mm* diameter. The angle of contact is equal to 130°. The surface tension of mercury in contact with air is 0.51 *N/m*.



Q2. The capillary depression of mercury in the 4 mm diameter capillary glass tube is 2.9 *mm*. Find the angle of contact, θ. The surface tension of mercury in contact with air is 0.52 *N/m*.



[Hint: Find θ_1 using the relation, surface tension force = weight of mercury column in the tube as we did before in the class. Then you can find the angle of contact θ by subtracting the angle θ_1 from 180°.]

Assignment 3

Q1. Find an expression for the pressure at a height Z from sea level for static air when the compression of air is assumed isothermal. The pressure at sea level is p_0.

Q2. Find the difference of pressure between the tanks A and B.