Fluid mechanics

Instruction 2

Week 2

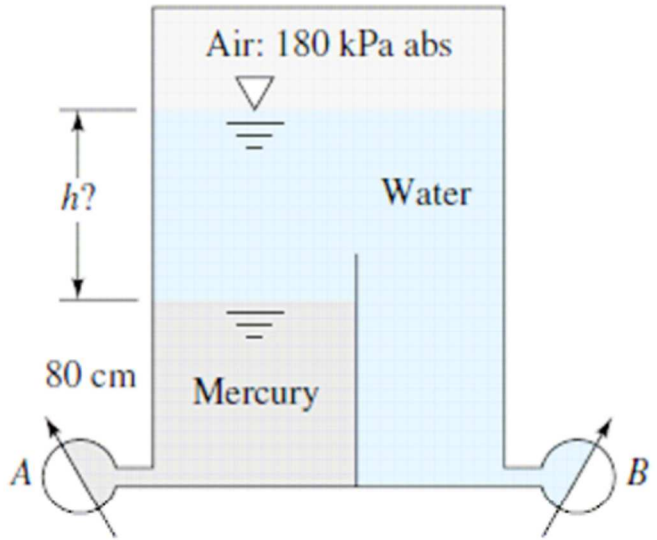
Van onderstaande vraagstukken zal tijdens de instructie er een aantal behandeld worden. Het is een goede voorbereiding er doorheen te kijken, en te proberen of je ze zelf kan oplossen.

Let op: vraagstuknummering is niet altijd uniform door de verschillende edities van ‘White’.

2.37, 2.44,
3.36, 3.50, 3.51, 3.73, 3.86

Bron: alle opgaven komen van het boek *Fluid Mechanics* van Frank M. White (McGraw-Hill Series in Mechanical Engineering)

Druk

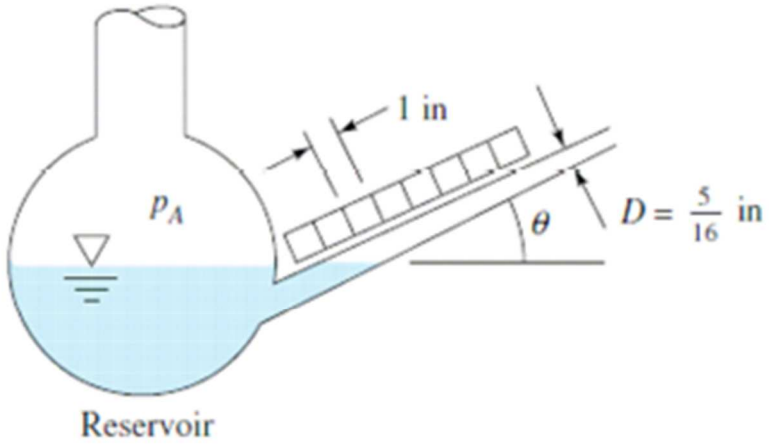


P2.21

P2.21 At 20°C gage *A* reads 350 kPa absolute. What is the height *h* of the water in cm? What should gage *B* read in kPa absolute? See Fig. P2.21.

Druk

P2.37 The inclined manometer in Fig. P2.37 contains Meriam red manometer oil, SG = 0.827. Assume that the reservoir is very large. If the inclined arm is fitted with graduations 1 in apart, what should the angle θ be if each graduation corresponds to 1 lbf/ft^2 gage pressure for p_A?

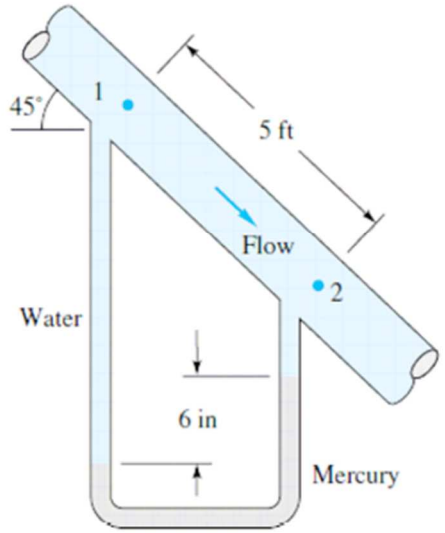


P2.37 Hint: 'SG' = Specific Gravity = soortelijk gewicht.
Verouderd, maar wel veel gebruikt
= relatieve dichtheid tov water (ρ = 998 kg/m^3)

Druk

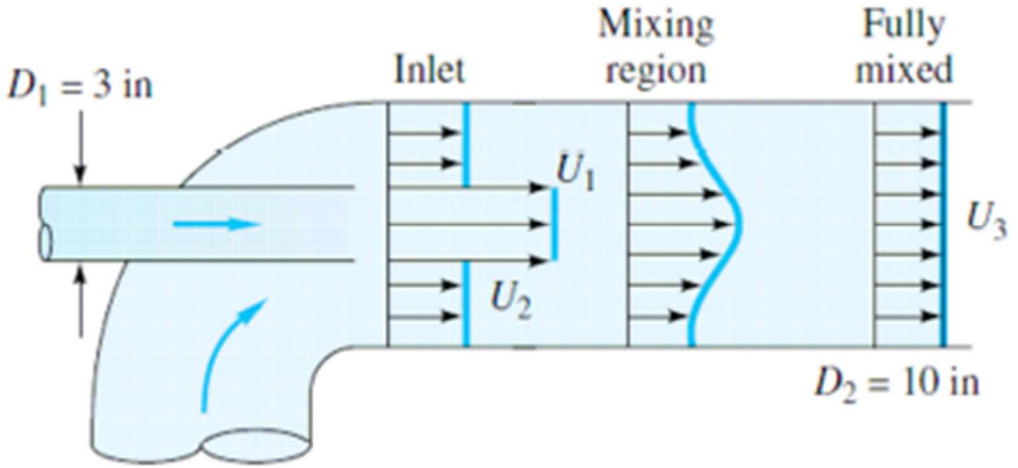
P2.44 Water flows downward in a pipe at 45°, as shown in Fig. P2.44. The pressure drop $p_1 - p_2$ is partly due to gravity and partly due to friction. The mercury manometer reads a 6-in height difference. What is the total pressure drop $p_1 - p_2$ in lbf/in^2? What is the pressure drop due to friction only between 1 and 2 in lbf/in^2? Does the manometer reading correspond only to friction drop? Why?

Het gaat hier meer om het denkwerk dat om het rekenwerk!



Massabalans

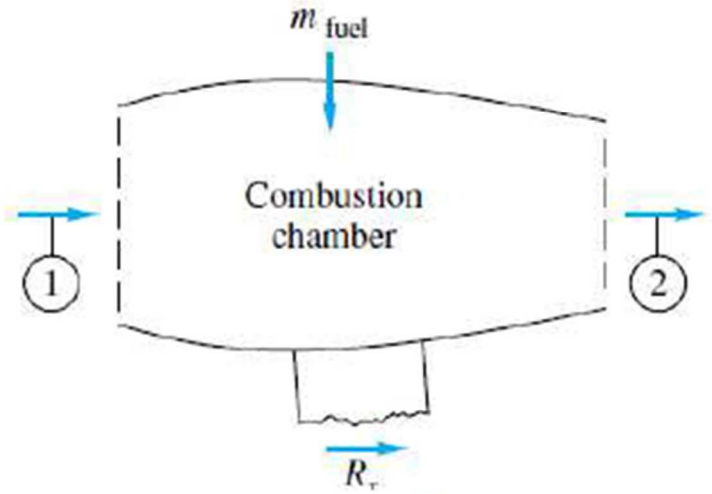
P3.36 The jet pump in Fig. P3.36 injects water at $U_1 = 40$ m/s through a 3-in-pipe and entrains a secondary flow of water $U_2 = 3$ m/s in the annular region around the small pipe. The two flows become fully mixed downstream, where U_3 is approximately constant. For steady incompressible flow, compute U_3 in m/s.



P3.36

Impulsbalans

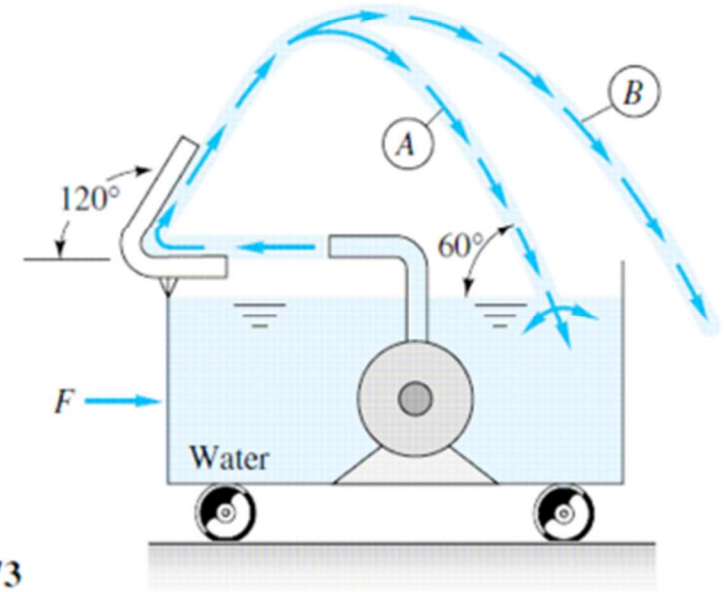
P3.50 The jet engine on a test stand in Fig. P3.50 admits air at 20°C and 1 atm at section 1, where $A_1 = 0.5$ m^2 and $V_1 = 250$ m/s. The fuel-to-air ratio is 1:30. The air leaves section 2 at atmospheric pressure and higher temperature, where $V_2 = 900$ m/s and $A_2 = 0.4$ m^2. Compute the horizontal test stand reaction R_x needed to hold this engine fixed.



P3.50

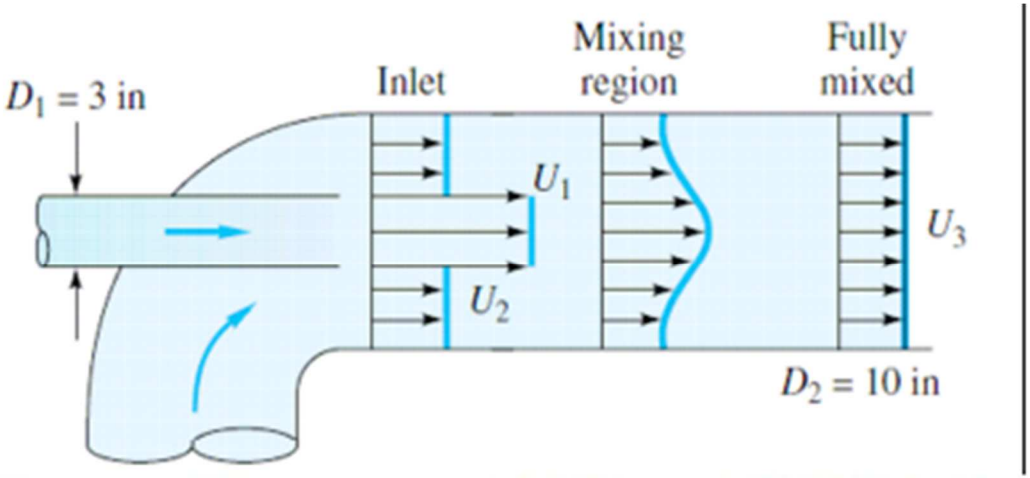
Impulsbalans

P3.73 A pump in a tank of water at 20°C directs a jet at 45 ft/s and 200 gal/min against a vane, as shown in Fig. P3.73. Compute the force F to hold the cart stationary if the jet follows (*a*) path *A* or (*b*) path *B*. The tank holds 550 gal of water at this instant.



P3.73

Impulsbalans



P3.86 For the water-jet pump of Prob. 3.36, add the following data: $p_1 = p_2 = 25$ lbf/in^2, and the distance between sections 1 and 3 is 80 in. If the average wall shear stress between sections 1 and 3 is 7 lbf/ft^2, estimate the pressure p_3. Why is it higher than p_1?