CE 3305 Engineering Fluid Mechanics
Exercise Set 9
Summer 2018 – GERMANY

Purpose : Static and dynamic pressure. Bernoulli's equation.
Assessment Criteria : Completion, plausible solutions, use **R** as a calculator.

Exercises

1. (Problem 4.55 pg 161) Figure 1 is a schematic of a glass tube inserted into a flowing stream of water with one opening directed upstream and the other end vertical. If the water velocity is 4 m/s, how high will the water rise in the vertical leg relative to the level of the water surface of the stream?
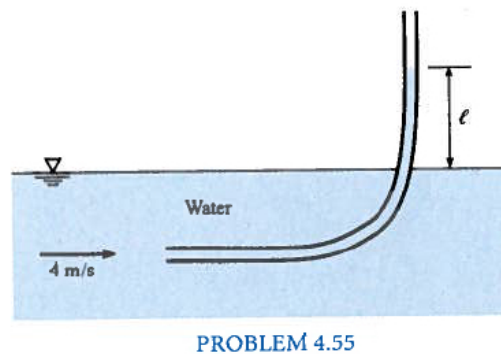

Figure 1: Tube for measuring velocity head.

(Problem 4.55 pg 161) (Continued)

2. (Problem 4.87 pg 164) Figure 2 is a schematic of a reservoir draining into a pipe. The velocity in the outlet pipe is 8 m/s and h=19m. Because of the rounded entrance to the pipe, the flow is assumed to be irrotational. What is the pressure at A?
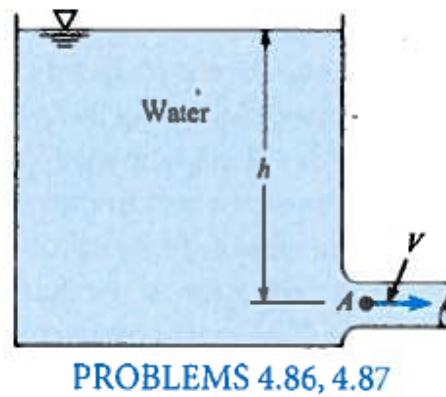

PROBLEMS 4.86, 4.87

Figure 2: Reservoir draining into a penstock (pipe).

(Problem 4.87 pg 164) (Continued)

3. (Problem 4.91 pg 165). Figure 3 is a schematic of ideal flow around an air foil. If the approach air velocity is $V_0=80m/s$, what is the pressure difference between the bottom and the top of this airfoil at points where the velocities are $V_1=85m/s$ and $V_2=75m/s$? Assume ρ_{air} is uniform at 1.2 kg/m^3.
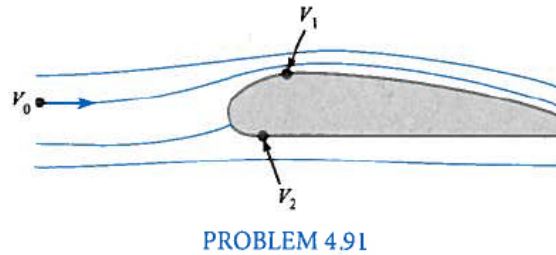

PROBLEM 4.91

Figure 3: Ideal flow around an airfoil.

(Problem 4.91 pg 165) (Continued)