CEE 345 Part 2, Sp 2012, Assignment #1

Due 5/9, 11:30am

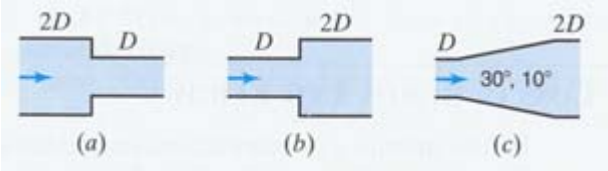
1. The flow in a 2.4-m-diameter pipeline with relative roughness of 0.0008 is fully turbulent. Over what length of pipe does the water lose an amount of head equal to 10 times its velocity head?

2. Munson 8.46. Assume the water is at 20^{o}C.

3. Munson 8.53.

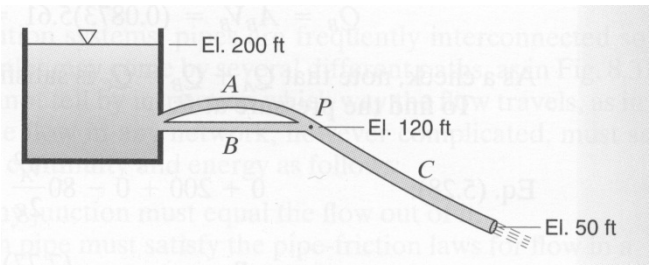
4. Munson 8.99. Assume that all the pipe elbows are identical and that the 200-ft length indicated for the pipe refers to the total length of pipe in the whole system. (Hint: Derive one relationship between f and V based on the system characteristics. Then solve this equation simultaneously with a second relationship based on the Moody diagram to determine the correct values of these two parameters. Once the two correct equations are identified, any of several different solution approaches should be successful.)

5. Two pipes with a diameter ratio of 1:2 are connected in series. If the velocity is 6.8 m/s in the smaller pipe, find the loss of head due to (a) sudden contraction; (b) sudden expansion; (c) expansion in conical diffusers with a total of angle of 10^o and 30^o.



6. Munson 8.112. (Hint: Based on system geometry and the energy equation, write the h_L's of two of the pipes in terms of the h_L of the third pipe. Guess h_L of the third pipe, compute the other two h_L's, and use those values to compute the flow rate in each pipe. Then, test whether continuity is satisfied at the junction. If it is not, iterate on the guess until continuity is satisfied.)

7. The three pipes in the following schematic are all new cast iron ($C_{HW} = 130$). The diameters of pipes A, B, and C are 6, 4, and 8 inches, respectively, and their lengths are 2000, 1600, and 4000 feet. (a) Find the diameter of a single, 5000-ft long cast iron pipe that is hydraulically equivalent to these pipes. (b) Find the water discharge rate based on the equivalent pipe, and then use that result to compute (c) the pressure at point P and (d) the flow rates in pipes A and B. Ignore minor losses.


El. 200 ft
A
P
El. 120 ft
B
C
El. 50 ft

8. The lengths and diameters for the pipes in the network shown below are indicated on the diagram. The Hazen-Williams *C* factor is 90 for all the pipes around the perimeter of the network, and 110 for those in the interior. Determine the flow through each pipe and the total headloss between points *a* and *j*.