COE-C2003 Basic course on fluid mechanics, S2021

Round 4: The energy equation and losses (return at the latest by Thu 14.10. at 13:00 o'clock)

Each problem (1-4) will be assessed on a scale of 0-3. Remember to explain the different stages in the solution. More detailed information can be found from MyCourses.

1. Water flows steadily from one location to another in the inclined pipe shown in Fig. 1. At one section, the static pressure is 55 kPa. At the other section, the static pressure is 34 kPa. Which way is the water flowing ? Explain.

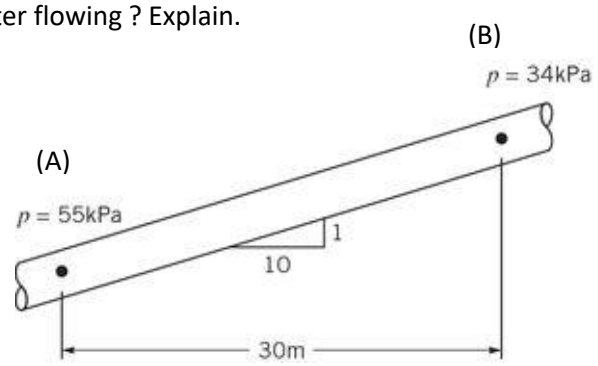

Figure 1: Problem 1 (Young et al, 2012)

2 What is the maximum possible power output of the hydroelectric turbine shown in Fig. 2 ?

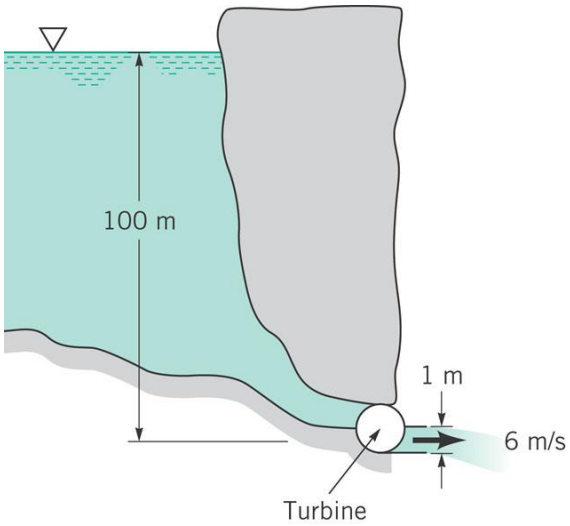

Figure 2. Problem 2

3 Gasoline (SG=0.68) flows through a pump at 0.12 m^3/s as indicated in Fig. 3. The loss between sections (1) and (2) is equal to $0.3V_1^2/2$. What will the difference in pressures between sections (1) and (2) be if 20 kW is delivered by the pump to the fluid ?

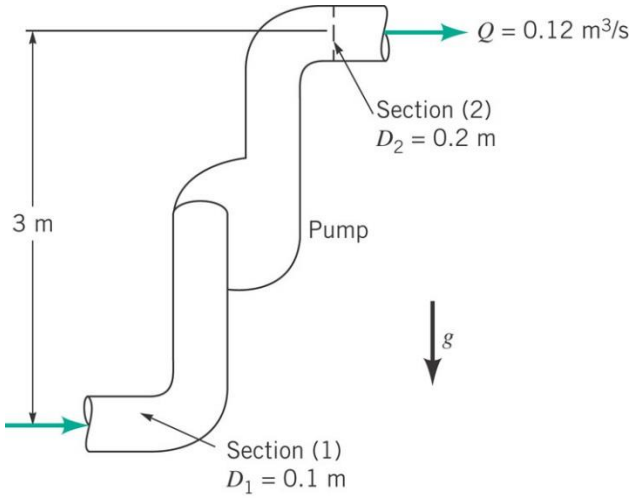

Figure 3. Problem 3

4. You will obtain numerical data from the course web pages (MyCourses: Exercises, Round 4) In the text file, there are 2 columns and 201 rows of data. Read this file into Matlab. Multiply the 2nd column data with your student number's last digit (if it is zero, then multiply with 10).

Plot this new data to the same figure with the original data (plot, hold on). Save the new data to a new text file (e.g. dlmwrite('newdata.txt',M,'delimiter','\t'). If needed, google 'matlab dlmwrite'. In the answer, show the coding, the figure, and list the new data (201 lines will take about 3 pages depending on the font size). **NOTE: again, use the New script when you make the code. Do not do the coding in the command window (a typical mistake made by many).** This will also help the assistant to run the code if necessary.