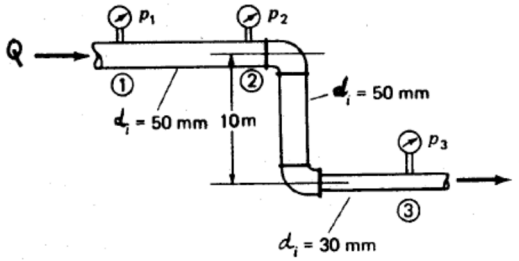
ULBM FSSA Dept. ME The 08/12/2024

2nd year ST

Tutorial N°7 Major and minor losses in pipes

Use the Haaland formula and Moody diagram to calculate major losses when possible.

1. Water flows through a pipe at a volume flow rate of 5 l/sec. Suppose the gauge pressures recorded are 12.5 Kpa, 11.5 Kpa, and 10.3 Kpa at points P_1, P_2, and P_3. What are the heights of the losses between points 1 and 2, 1 and 3?

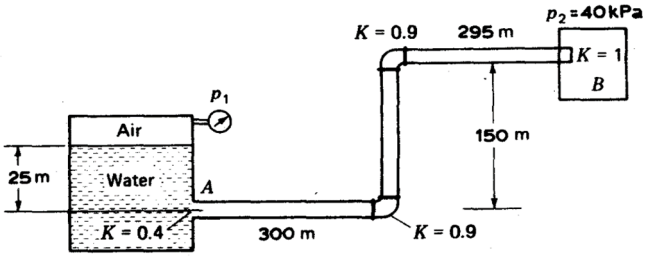


2. Water (viscosity v =1.02 10^{-6} m^2/s) flows through a steel pipe (roughness of ε = 0.00026 m) at a velocity of 4.2 m/s. The pipe is 400 m long and 150 mm in diameter.

1. Identify the regime of the flow in the pipe.
2. Calculate the loss height due to friction (major) in meters and pascals.

3. Water (of viscosity v =0.113 10^{-5} m^2/s) is consumed in an industrial purifier at a volume flow rate of 0.1 m^3/s. If the pipe diameter is 150 mm with a roughness of ε = 0.000046 m, calculate:

1. The linear or major losses in the pipes.
2. The minor losses.
3. The pressure P_1 required in the tank.



4. What height H is necessary to produce 0.3 m^3/sec of discharge? Take K_L =0.5 for the inlet and 0.12 for the diffusers for minor pressure losses.