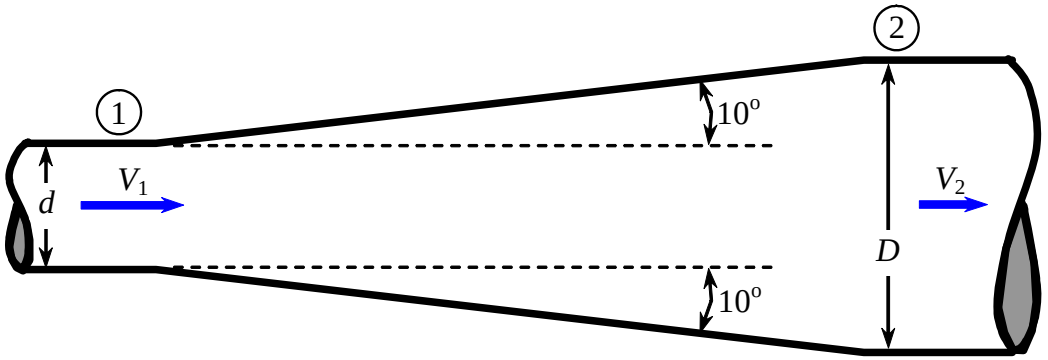
Today, we will:

- Do an example problem – diffuser
- Begin discussing ***pumps***, and how they are analyzed in pipe flow sytems

Example Problem – Diffuser

Given: Water ($\rho = 1000$ kg/m^3, $\mu = 1.00 \times 10^{-3}$ kg/m·s) flows through a horizontal diffuser, as sketched. The flow is fully developed at both locations 1 and 2. The inner diameter changes from d to D through the diffuser. The outlet of the diffuser is open to atmospheric pressure.



Given information:

- $d = 1.2$ cm
- $D = 2.0$ cm
- $\theta = 2 \times 10^{\circ} = 20^{\circ}$ (θ is the total included angle)
- $V_1 = 6.0$ m/s
- $P_2 = P_{atm}$
- $\alpha_1 = 1.06$ and $\alpha_2 = 1.06$ (fully developed turbulent pipe flow)

To do: Calculate the gage pressure at location 1 and discuss.

Solution: *To be done in class*.