

8.42

8.42 Water flows through a horizontal plastic pipe with a diameter of 0.2 m at a velocity of 10 cm/s. Determine the pressure drop per meter of pipe using the Moody chart.

The pressure drop in the pipe can be found from

$$\Delta P = f \frac{l}{D} \rho \frac{V^2}{2}$$

The friction factor is determined from the Moody chart.

$$Re = \frac{\rho V D}{\mu} = \frac{(999)(0.1)(0.2)}{1.12 \times 10^{-3}} = 1.8 \times 10^4$$

For plastic pipe,  $\epsilon = 0.0 \text{ mm}$

$$\epsilon/D = 0.0/0.2 = 0.0$$

From the Moody chart

$$f = 0.026$$

So  $\Delta P$  per meter ( $l=1\text{m}$ )

$$\Delta P = (0.026) \left( \frac{1}{0.2} \right) \left[ \frac{999(0.1)^2}{2} \right]$$

$$\underline{\underline{\Delta P = 0.649 \text{ Pa per meter}}}$$