Example 8:

Water flows steadily through a pipe with a uniform inlet velocity, $U$, and a velocity distribution at the outlet given by:

$$\vec{V} = U_{\text{max}} \left[1 - \left(\frac{r}{R}\right)^2\right] \hat{i}$$

Solve for $U$ for $U_{\text{max}} = 10.0$ ft/s.

Known: Steady pipe flow, velocity distribution at inlet and exit, $U_{\text{max}} = 10.0$ ft/s

Assumptions: Steady flow, incompressible liquid

Find: $U$

Solution:

Answers: $U = \frac{U_{\text{max}}}{2} = 5.00$ ft/s