

5.9

5.9 The wind blows through a 7 ft \times 10 ft garage door opening with a speed of 5 ft/s as shown in Fig. P5.9. Determine the average speed, V , of the air through the two 3 ft \times 4 ft openings in the windows.

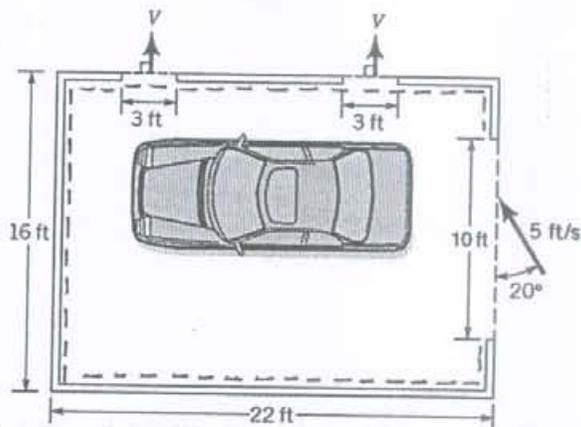


FIGURE P5.9

For steady incompressible flow

$$Q_{\text{garage door}} = Q_{\text{window}} + Q_{\text{window}}$$

or

$$A_{\text{garage door}} V_{\text{normal to garage door}} = A_{\text{window}} V + A_{\text{window}} V$$

so the average speed, V , of the air through the two windows is

$$V = \frac{A_{\text{garage door}} V_{\text{normal to garage door}}}{2A_{\text{window}}} = \frac{(7\text{ft})(10\text{ft})(5\frac{\text{ft}}{\text{s}}) \sin 20^\circ}{2(3\text{ft})(4\text{ft})} = \underline{\underline{4.99 \frac{\text{ft}}{\text{s}}}}$$