

4.62

4.62 In the region just downstream of a sluice gate, the water may develop a reverse flow region as is indicated in Fig. P4.62 and Video V10.4. The velocity profile is assumed to consist of two uniform regions, one with velocity $V_a = 10$ fps and the other with $V_b = 3$ fps. Determine the net flowrate of water across the portion of the control surface at section (2) if the channel is 20 ft wide.

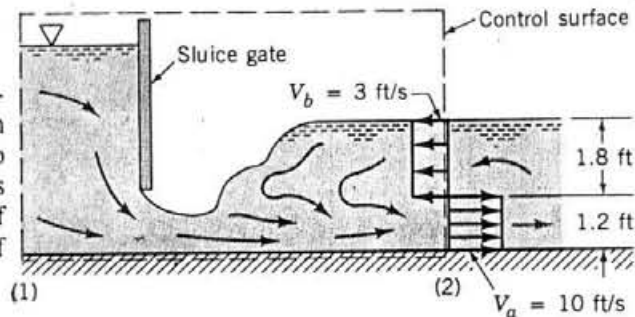


FIGURE P4.62

$$\begin{aligned}
 Q &= V_a A_a - V_b A_b = (10 \frac{\text{ft}}{\text{s}})(1.2 \text{ft})(20 \text{ft}) - (3 \frac{\text{ft}}{\text{s}})(1.8 \text{ft})(20 \text{ft}) \\
 &= \underline{\underline{132 \frac{\text{ft}^3}{\text{s}}}}
 \end{aligned}$$