From: Open Channel Flow (H. Chaudhry)

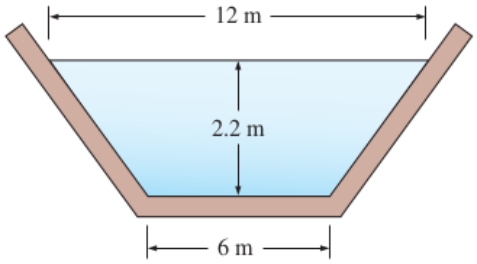
4.1. A 5-m wide rectangular channel is carrying a flow of 5 m^3/s. If the Manning$n = 0.013$ and the bottom slope, $S_o = 0.001$, determine the normal depth.

4.12. The cross section of a drainage channel may be approximated as a trapezoidal section with the bottom width of 15 ft and side slope of 1.5H:1V. If the channel drops 2.5 ft/mile, compute the flow depth for a flow of 150 ft^3/sec. Assume $n = 0.024$.

4.14. An 8-ft diameter concrete-lined sewer is laid at a bottom slope of 1 ft/mile. Find the flow depth for a flow of 30 ft^3/sec.

From: Fluids Mechanics (Cengel)

13–53 A trapezoidal channel with a bottom width of 6 m, free surface width of 12 m, and flow depth of 2.2 m discharges water at a rate of 120 m^3/s. If the surfaces of the channel are lined with asphalt ($n = 0.016$), determine the elevation drop of the channel per km. *Answer:* 5.61 m



13–56 A cast iron V-shaped water channel shown in Fig. P13–56 has a bottom slope of 0.5°. For a flow depth of 0.75 m at the center, determine the discharge rate in uniform flow. *Answer:* 1.03 m^3/s

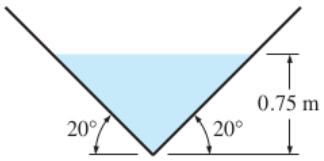
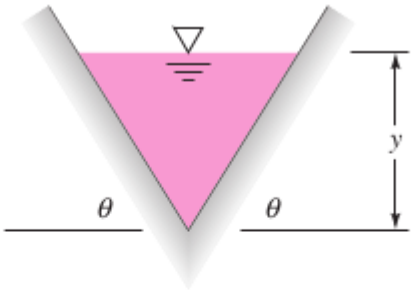


FIGURE P13–56

13–64E A rectangular channel with a bottom slope of 0.0004 is to be built to transport water at a rate of 750 ft^3/s. Determine the best dimensions of the channel if it is to be made of (*a*) unfinished concrete and (*b*) finished concrete. *Answer:* (*a*) 16.6 ft × 8.28 ft, (*b*) 15.6 ft × 7.81 ft

From: Fluids Mechanics (F. White)



P10.41

P10.42 It is desired to deliver 30,000 gal/min of water in a brickwork channel laid on a slope of 1:100. Which would require fewer bricks, in uniform flow: (*a*) a V-channel with $\theta = 45°$, as in Fig. P10.41, or (*b*) an efficient rectangular channel with $b = 2y$?

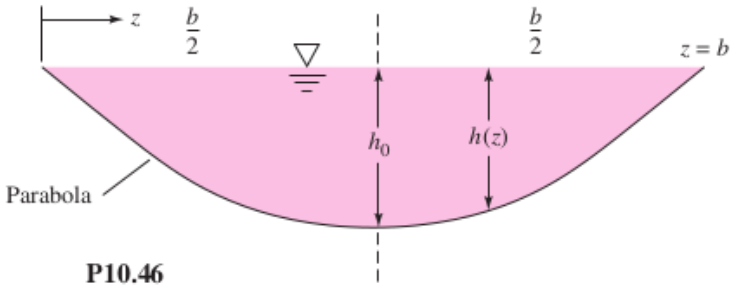
P10.43 What are the most efficient dimensions for a riveted steel rectangular channel to carry 4.8 m^3/s at a slope of 1:900?

P10.46 It is suggested that a channel that reduces erosion has a parabolic shape, as in Fig. P10.46. Formulas for area and perimeter of the parabolic cross section are as follows [7, p. 36]:

$$A = \frac{2}{3}bh_0;\quad P = \frac{b}{2}\left[\sqrt{1+\alpha^2} + \frac{1}{\alpha}\ln(\alpha + \sqrt{1+\alpha^2})\right]$$

$$\text{where}\quad \alpha = \frac{4\,h_0}{b}$$

For uniform flow conditions, determine the most efficient ratio h_0/b for this channel (minimum perimeter for a given constant area).



P10.46