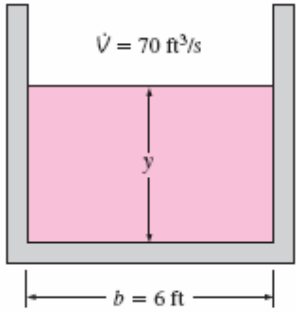
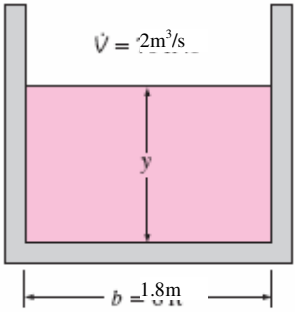


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| 726 | <p>13-18E Water at 70°F is flowing uniformly in a wide rectangular channel at an average velocity of 6 ft/s. If the water depth is 0.5 ft, determine (a) whether the flow is laminar or turbulent and (b) whether the flow is subcritical or supercritical.</p> | <p>13-18 Water at 21°C is flowing uniformly in a wide rectangular channel at an average velocity of 1.8m/s. If the water depth is 15cm, determine the (a) whether the flow is laminar or turbulent and (b) whether the flow is subcritical or supercritical.</p> |
| 726 | <p>13-35E Water at 65°F flows at a depth of 0.8 ft with an average velocity of 14 ft/s in a wide rectangular channel. Determine (a) the Froude number, (b) the critical depth, and (c) whether the flow is subcritical or supercritical. What would your response be if the flow depth were 0.2 ft?</p> | <p>13-35 Water at 18°C flows at a depth of 24cm with an average velocity of 4.2m/s in a wide rectangular channel. Determine (a) the Froude number, (b) the critical depth, and (c) whether the flow is subcritical or supercritical. What would your response be if the flow depth were 60cm.</p> |
| 726 | <p>13-36E Repeat Prob. 13-35E for an average velocity of 10 ft/s.</p> | <p>13-36 Repeat Prob. 13-35 for an average velocity of 3m/s.</p> |
| 727 | <p>13-53E A 6-ft-diameter semicircular channel made of unfinished concrete is to transport water to a distance of 1 mi uniformly. If the flow rate is to reach 150 ft³/s when the channel is full, determine the minimum elevation difference across the channel.</p> | <p>13-53 A 2m diameter semicircular channel made of unfinished concrete is to transport water to a distance of 1.6km uniformly. If the flow rate is to reach 4.25m³/s when the channel is full, determine the minimum elevation difference across the channel.</p> |
| 728 | <p>13-60E Water is to be transported in a cast iron rectangular channel with a bottom width of 6 ft at a rate of 70 ft³/s. The terrain is such that the channel bottom drops 1.5 ft per 1000 ft length. Determine the minimum height of the channel under uniform-flow conditions.</p> | <p>13-60 Water is to be transported in a cast iron rectangular channel with a bottom width of 1.8m at a rate of 2m³/s. The terrain is such that the channel bottom drops 0.5m per 300m length. Determine the minimum height of the channel under uniform-flow conditions.</p> |

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| 728 |  <p style="text-align: center;">FIGURE P13-60E</p> |  <p style="text-align: center;">FIGURE P13-60</p> |
| 728 | <p>13-67E A rectangular channel with a bottom slope of 0.0005 is to be built to transport water at a rate of 800 ft³/s. Determine the best dimensions of the channel if it is to be made of (a) unfinished concrete and (b) finished concrete.</p> | <p>13-67 A rectangular channel with a bottom slope of 0.0005 is to be built transport water at a rate of 22.5m³/s. Determine the best dimensions of the channel if it is to be made of (a) unfinished concrete and (b) finished concrete.</p> |
| 729 | <p>13-81E Consider the flow of water through a 12-ft-wide unfinished-concrete rectangular channel with a bottom slope of 0.5°. If the flow rate is 300 ft³/s, determine if the slope of this channel is mild, critical, or steep. Also, for a flow depth of 3 ft, classify the surface profile while the flow develops.</p> | <p>13-81 Consider the flow of water through a 4m wide unfinished-concrete rectangular channel with a bottom slope of 0.5°. If the flow rate is 8.5m³/s, determine if the slope of this channel is mild, critical, or steep. Also, for a flow depth of 1m, classify the surface profile while the flow develops.</p> |
| 729 | <p>13-88E Water flowing in a wide channel at a depth of 2 ft and a velocity of 40 ft/s undergoes a hydraulic jump. Determine the flow depth, velocity, and Froude number after the jump, and the head loss associated with the jump.</p> | <p>13-88 Water flowing in a wide channel at a depth of 0.6m and a velocity of 12m/s undergoes a hydraulic jump. Determine the flow depth, velocity, and Froude number after the jump, and the head loss associate with the jump.</p> |
| 730 | <p>13-101E A full-width sharp-crested weir is to be used to measure the flow rate of water in a 10-ft-wide rectangular channel. The maximum flow rate through the channel is 150 ft³/s, and the flow depth upstream from the weir is not to exceed 5 ft. Determine the appropriate height of the weir.</p> | <p>13-101 A full-width sharp-crested weir is to be used to measure the flow rate of water in a 3m wide rectangular channel. The maximum flow rate through the channel is 4.25m³/s, and the flow depth upstream from the weir is not to exceed 1.5m. Determine the appropriate height of the weir.</p> |

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| 731 | 13-105E Water flows through a sluice gate with a 1.1-ft-high opening and is discharged with free outflow. If the upstream flow depth is 5 ft, determine the flow rate per unit width and the Froude number downstream the gate. | 13-105 Water flows through a sluice gate with a 33cm high opening and is discharged with free outflow. If the upstream flow depth is 1.5m, determine the flow rate per unit width and the Froude number downstream the gate. |
| 731 | 13-106E Repeat Prob. 13-105E for the case of a drowned gate with a downstream flow depth of 3.3 ft. | 13-106 Repeat Prob. 13-105 for the case of a downed gate with a downstream flow depth of 1m. |
| 731 | 13-108E Consider water flow through a wide channel at a flow depth of 8 ft. Now water flows through a sluice gate with a 1-ft-high opening, and the freely discharged outflow subsequently undergoes a hydraulic jump. Disregarding any losses associated with the sluice gate itself, determine the flow depth and velocities before and after the jump, and the fraction of mechanical energy dissipated during the jump. | 13-108 Consider water flow through a wide channel at a flow depth of 2.4m. Now water flows through a sluice gate with a 0.3m high opening, and the freely discharged outflow subsequently undergoes a hydraulic jump. Disregarding any losses associated with the sluice gate itself, determine the flow depth and velocities before and after the jump, and the fraction of mechanical energy dissipated during the jump. |
| 732 | 13-124E A rectangular channel with unfinished concrete surfaces is to be built to discharge water uniformly at a rate of 200 ft ³ /s. For the case of best cross section, determine the bottom width of the channel if the available vertical drop is (a) 8 and (b) 10 ft per mile. <i>Answers: (a) 7.86 and (b) 7.54 ft per mile</i> | 13-124 A rectangular channel with unfinished concrete surfaces is to be built to discharge water uniformly at a rate of 5.66m ³ /s. For the case of best cross section, determine the bottom width of the channel if the available vertical drop is (a) 3 and (b) 5m per km. |
| 732 | 13-125E Repeat Prob. 13-124E for the case of a trapezoidal channel of best cross section. | 13-125 Repeat Prob. 13-124 for the case of a trapezoidal channel of best cross section. |
| 734 | 13-141E Consider two identical 12-ft-wide rectangular channels each equipped with a 2-ft-high full-width weir, except that the weir is sharp-crested in one channel and broad-crested in the other. For a flow depth of 5 ft in both channels, determine the flow rate through each channel. <i>Answers: 244 ft³/s, 79.2 ft³/s</i> | 13-141 Consider two identical 4m wide rectangular channels each equipped with a 0.6m high full-width weir, except that the weir is sharp-crested in one channel and broad-crested in the other. For a flow depth of 1.5m in both channels, determine the flow rate through each channel. |

