

Q1

A trapezoidal canal with side slopes of 1:1 has a bottom width of 4 m and carries a flow of 25 m³/s.

- (a) Find the critical depth and critical velocity.*
- (b) If the canal is lined with brick ($n = 0.015$), find the critical slope for the same rate of discharge.*

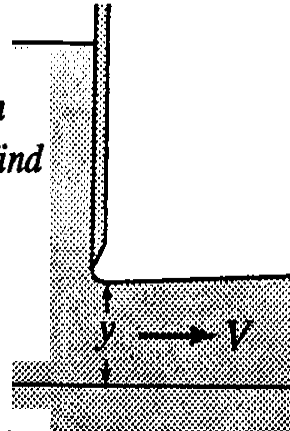
Q2

A rectangular channel 50 ft wide ($n = 0.015$) carries a flow of 375 cfs. For this flow, find the critical depth, the critical velocity.

Q3

Water is released from a sluice gate in a rectangular channel 1.5 m wide such that the depth is 0.6 m and the velocity is 4.5 m/s (Fig) Find

- (a) the critical depth for this specific energy;*
- (b) the critical depth for this rate of discharge;*
- (c) the type of flow and the*



Q4

A flow of 90 cfs is carried in a rectangular channel 10 ft wide at a depth of 1.6 ft. If the channel is made of rough concrete ($n = 0.016$), find the slope necessary to sustain uniform flow at this depth. What roughness coefficient would be required to produce uniform critical flow for the given rate of discharge on this slope?

Q5

A vertical sluice gate with an opening of 0.67 m produces a downstream jet depth of 0.40 m when installed in a long rectangular channel 5.0 m wide conveying a steady discharge of 20.0 m³/s. Assuming that the flow downstream of the gate eventually returns to the uniform flow depth of 2.5 m.

- (a) Verify that a hydraulic jump occurs.*
- (b) Calculate the head loss in the jump.*
- (c) If the head loss through the gate is $0.05 V_j^2/2g$ calculate the depth upstream of the gate .*