Wollo UNIVERSITY
KOMBOLCHA INSTITUTE OF TECHNOLOGY
DEPARTMENT OF HYDRAULIC ENGINEERING
Open-Channel Hydraulics assignment

Q1. An expansion in a horizontal rectangular channel takes place from a width of 2.0 m to 3.0m. The depths of flow for a discharge of 7.20m^3/s are 1.20m and 1.40m in the narrower and wider sections respectively .Estimate the energy loss in the transition.

Q2. A rectangular channel is 3.0 m wide and carries a discharge of 15.0 m^3/s at a depth of 2.0m. At a certain section of the channel it is proposed to reduce the width to 2.0 m and to alter the bed elevation by z to obtain critical flow at the contracted section with out altering the upstream depth. What should be the value of z?

Q3. For a trapezoidal channel with base width b = 6.0 m and side slope m = 2, calculate the critical depth of flow if Q = 17 m^3/s.

Q4. Water flows in 5m wide rectangular channel made from unfinished concrete with n=0.015. The channel contains a long reach on which S_o =0.020. At one section, flow is at depth, y_1=1.5m with speed v_1=4m/s. Estimate the channel location where the flow reaches a depth of 0.9m.

Q5. As shown in fig.1, a rectangular channel carries 1.6m^3/s per unit width of channel that has n=0.011 and S_o=0.0016. If a 5m height dam is placed across the channel, determine the water surface profile up stream from the dam. Use the direct integration method with 0.30m depth increments.

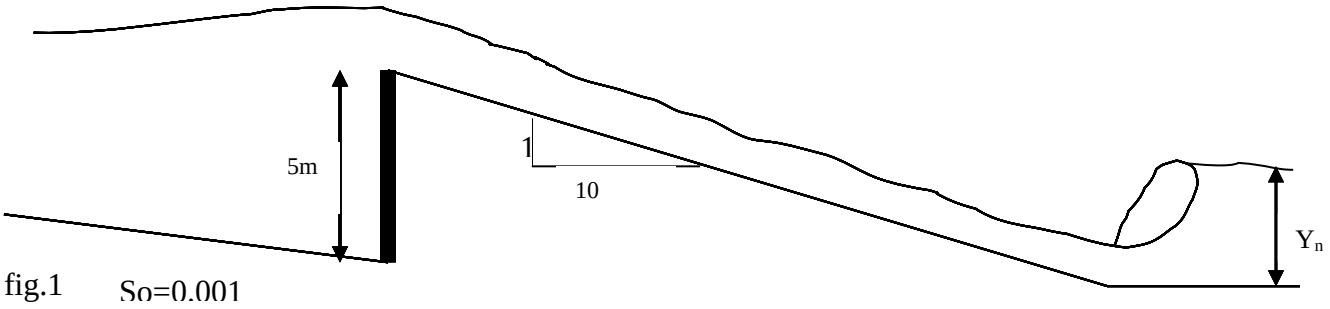

fig.1 So=0.001

Q6. If a series of three channels of longitudinal slope (i.e. S_o <S_c) is transmitted to a channel of slope (So>Sc) and finally enters the channel of slope (So=Sc) as fig.2 below. At what transition a Hydraulic jump is formed? Why? Show by plotting the flow profiles at each reaches.

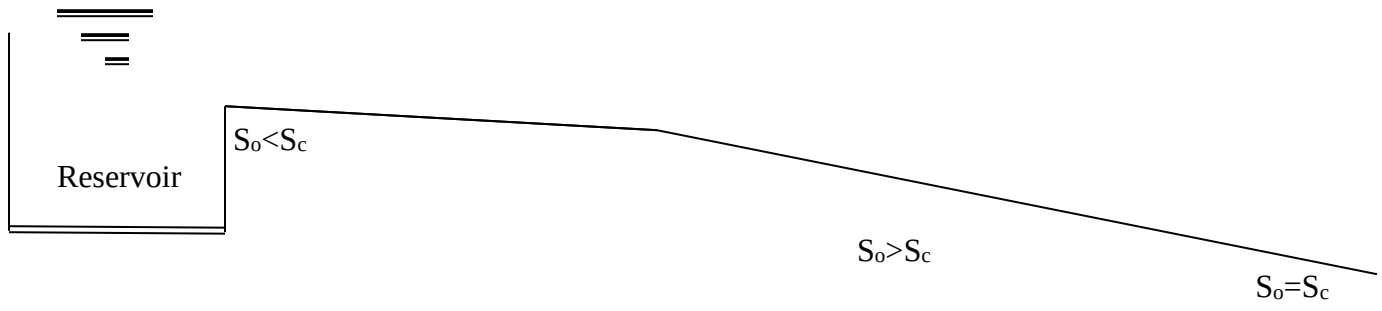

Fig.2