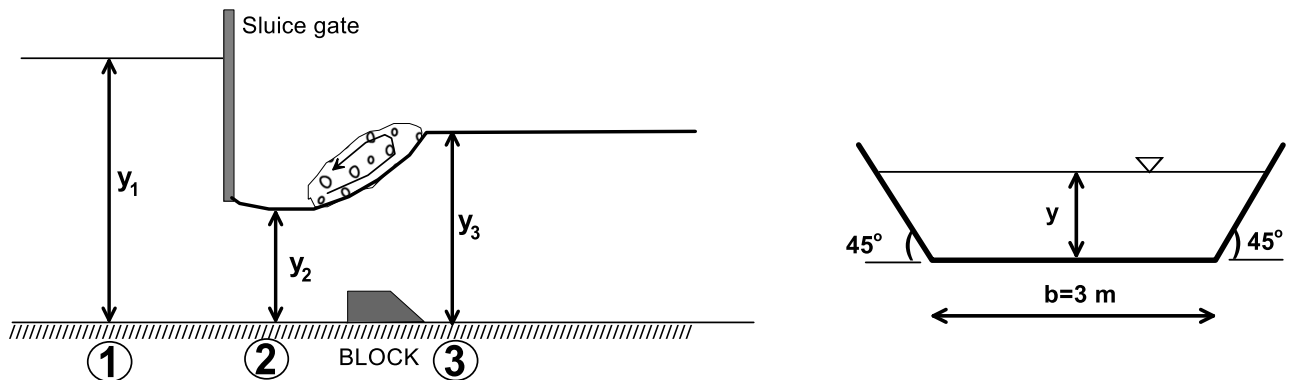


CE376 HYDROMECHANICS
HOMEWORK-VIII
DUE DATE: 4.06.2020

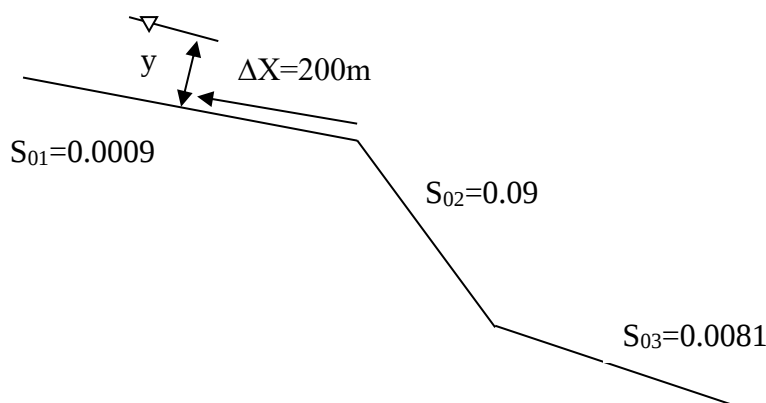
Q1) In a **trapezoidal open channel** shown below, under a sluice gate, a hydraulic jump occurs. If the discharge rate is $Q=20 \text{ m}^3/\text{s}$ and the water depth before the jump is $y_2=1.2 \text{ m}$ and after the jump $y_3=3 \text{ m}$;

- Find the force on the block and loss of energy in jump ΔE ($\gamma=10 \text{ kN/m}^3$)
- Calculate water depth at section 1, y_1
- Show all the water depths **in specific force** and in **specific energy curves**. On the curves indicate the alternate and sequent water depths.



Q2) In a **rectangular channel** with bottom width of $B=4 \text{ m}$, the critical water depth is determined as $y_{cr}=1 \text{ m}$. Manning roughness parameter is $n=0.015$. The bottom slope of the channel takes three different values as shown in the Figure 1 as, $S_{01}=0.0009$, $S_{02}=0.09$, $S_{03}=0.0081$.

- Calculate the critical channel bottom slope
- Calculate the uniform water depths and determine the type of the flows on **three of the slopes**.
- Show the water surface profiles on the slopes.
- Calculate the water depth at a distance of $\Delta X=200 \text{ m}$ upstream of the first slope $S_{01}=0.0009$ (in three steps).



Q3) In a **trapezoidal channel**, the discharge rate is $Q=10 \text{ m}^3/\text{s}$. The bottom width of the channel is $B=4 \text{ m}$, and side slope of the channel is 1:1. Manning roughness parameter is $n= 0.015$. Bottom slope of the channel is $S=0.0004$

- a) Calculate the uniform flow depth
- b) Calculate the critical slope
- c) Estimate the water surface profile type and calculate the horizontal distance between the water depths of $y_1=2.90 \text{ m}$ and $y_2=2.7 \text{ m}$. (take an interval depth of 2.8m)