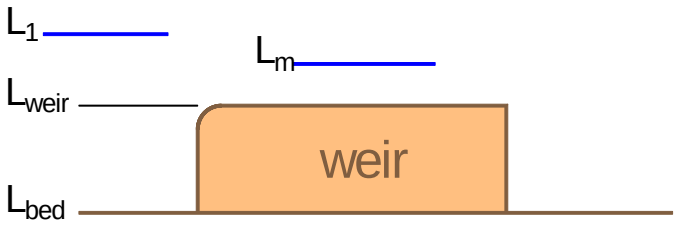
Hydraulics 3 Laboratory: Open-Channel Flow

Student name:

Date:

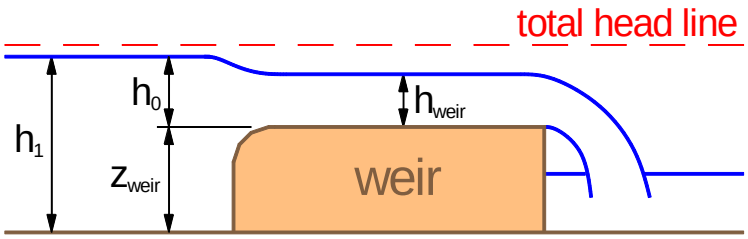
Part 1: Broad-Crested Weir



Raw Data

Channel width, b: _____ mm

Levels from point gauge				Water collection	
L_{bed} (mm)	L_{weir} (mm)	L_1 (mm)	L_m (mm)	Volume (L)	Time (s)
				30	
				30	



Analysed Results

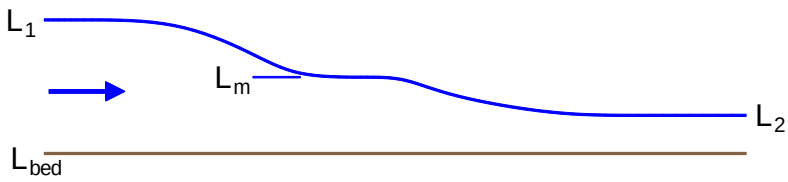
Channel width, b: _____ m
Height of weir, z_{weir}: _____ m

Measurements				Critical depth (eq. (1))	Ideal discharge (eq. (2))	Discharge coefficient (eq. (3))
h_1 (m)	h_{weir} (m)	h_0 (m)	Q ($m^3\ s^{-1}$)	h_c (m)	Q_{ideal} ($m^3\ s^{-1}$)	c_d

Questions For Consideration (No submitted answers required)

Where do we expect the flow to have critical depth h_c? Is this observed?

Part 2: Venturi Flume

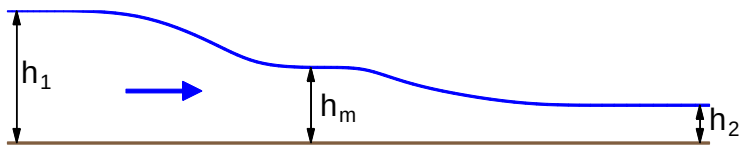


Raw Data

Channel width, b: _____ mm
Throat width, $b_{\min}$: _____ mm

Levels from point gauge				Water collection	
L_{bed} (mm)	L_1 (mm)	L_m (mm)	L_2 (mm)	Volume (L)	Time (s)
				30	
				30	

Analysed Results



Channel width, b: _____ m
Throat width, $b_{\min}$: _____ m

Discharge	Water depths			Velocities			Froude numbers			Total head	
Q ($m^3\ s^{-1}$)	h_1 (m)	h_m (m)	h_2 (m)	V_1 ($m\ s^{-1}$)	V_m ($m\ s^{-1}$)	V_2 ($m\ s^{-1}$)	Fr_1	Fr_m	Fr_2	H_1 (m)	H_2 (m)

Questions For Consideration (No submitted answers required)

Is a subcritical to supercritical flow transition observed?

Did critical conditions occur at the throat? If not, suggest reasons why not.

Is total head conserved through the device? If not, suggest reasons why not.

Part 3: Gate

Provide annotated sketches of the water level in the channel for horizontal and sloping beds with both weir and gate in place. Make sure that you label any hydraulic jump, and mark where the flow is subcritical, critical or supercritical.

- Sketch for horizontal bed

- Sketch for sloping bed