Experiment 9

COEFFICIENT OF DISCHARGE FOR A TRIANGULAR NOTCH

OBJECTIVE:

- To determine the 'Coefficient of Discharge' for a triangular or v-notch weir.

APPARATUS:

- The F1-10 Hydraulics Bench
- The F1-13 Stilling baffle
- The F1-13 Triangular or v-notch weir
- Vernier Height Gauge
- Stop Watch
- Spirit Level

THEORY:

The v-notch weir is a notch with a V shape opening. V-notch weir typically used to measure low flows within a narrow operating range. The angle of the v-notch in the figure 1 above is 90°.

$$\mathbf{Q_{th} = \frac{8}{15}\sqrt{2g}\tan\left(\frac{\theta}{2}\right)H^{\frac{5}{2}}}$$

$$\mathbf{Q_{act} = C_d Q_{th} = \frac{8}{15}\sqrt{2g}\tan\left(\frac{\theta}{2}\right)H^{\frac{5}{2}}}$$

Where, C_d = Coefficient discharge

θ = The angle of notch

H = Head above bottom of notch

Q = Flow rate

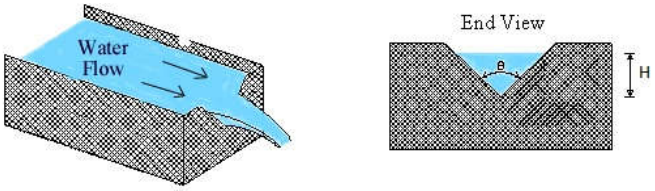

Figure 1: V-notch weir

PROCEDURE:

1. Weir apparatus was leveled on the hydraulic bench and the V- notch weir was installed.
2. Hydraulic bench flow control valve was opened slowly to admit water to the channel until the water discharges over the weir plate. The water level was ensured even with the crest of the weir.
3. The flow control valve was closed and the water level was allowed to stabilize.
4. Vernier Gauge was set to a datum reading using the top of the hook. The gauge was positioned about half way between the notch plate and stilling baffle.
5. Then, water was admitted to the channel. The water flow was adjusted by using the hydraulic bench flow control valve to obtain heads (H).
6. Water flow condition was left to stabilize, head readings were taken in every increasing of 1 cm.
7. Step 4 and 5 were repeated for different flow rate.
8. The readings of volume and time using the volumetric tank were taken to determine the flow rate. The volume taken was constant which 3L.
9. The results were recorded in the tables.

TABLE OF OBSERVATIONS AND CALCULATIONS:

V(L)	H (m)	Time (s)			Average Time (s)	Q (m^3/s)
		T_1	T_2	T_3		

GRAPHICAL RELATIONSHIP:

- Plot Q_{act} against $H^{5/2}$ and determine the slope of the graph. Then the coefficient of discharge C_d can then be calculated.

CONCLUSION AND RECOMMENDATIONS:

- Discuss why there is a discrepancy between the theoretical and computed discharge values
- What are the limitations of the experiment?
- How does the C_d value computed from the slope?
- Compare between Cd value of both rectangular and triangular notches.