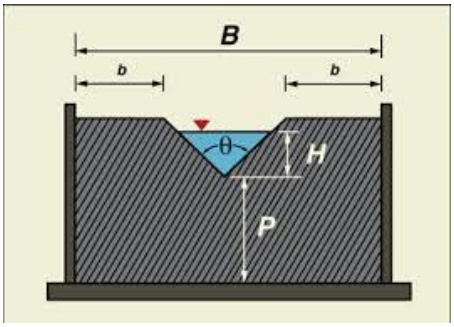
V- Notch

Aim:-

To determine the coefficient of discharge of V-notch.

Apparatus Required:- A Channel with V- Notch, hook gauge, collecting tank, pizometer, etc.

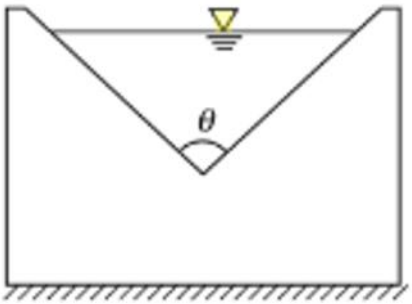


Theory

A notch is an opening in the side of a measuring tank or reservoir extending above the free surface. These notches are used to measure discharge of open channel flows, by passing or placing or constructing them across the stream. Notches are generally used for measuring discharge in small open channels or laboratory flumes.

The discharge over notch is measured by measuring the head acting over the notch. As water approaches the notch, its surface becomes curved. Therefore, the head over the notch is to be measured at the upstream of the notch where the effect of curvature is minimum. Also, it should be close to the notch so that the loss of energy between head measuring section and notch is neglegible. In practical, the head over notch is measured at a distance of 3 to 4 times the maximum head from the notch.

V-notch or Triangular notch



The V-notch or triangular notch is sharp crested notch, which is maily used to determine the low rate of flow.

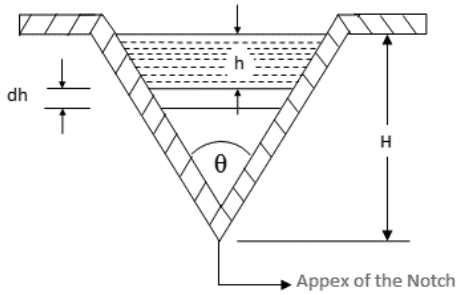


Fig : Triangular Notch

Let,
H = Height of the liquid above the apex of the notch
θ = Angle of the notch
Cd = Coefficient of discharge
From the geometry of the figure, we find that,

$$\text{width of the notch at the water surface} = 2H\tan\frac{\theta}{2}$$

$$\therefore \text{Area of the strip} = 2(H-h)\tan\frac{\theta}{2}.dh$$

We know that the theoretical velocity of water through the strip $= \sqrt{2gh}$

and discharge over the notch,

$$dq = C_d \times \text{Area of strip} \times \text{Theoretical velocity}$$

$$\Rightarrow dq = C_d \times 2(H-h)\tan\frac{\theta}{2}.dh\sqrt{2gh}$$

Procedure:-

1. Start the pump by pressing start button.

2. Open the inlet valve and allow the water to fill in the channel till crest level.
3. Note the theoretical discharge of the V- Notch.
4. Note actual discharge reading of the V- notch from the collecting tank.
5. Stop the pump by pressing the stop button.

- Initial reading (water level till crest) =3.15 cm
- Final reading = 7.12 cm
- Head of water, H = 3.97 cm
- Theoretical discharge, Q_{th}= 741.9 cm^3/ sec
- Time required by water to fill 10cm height = 72 sec
- Discharge of water, Q_{act} = 486.1 cm^3/sec

Observation

Length of the collecting tank = 70 cm

Breadth of the collecting tank = 50cm

Theoretical discharge, Q_{th}= 741.9 cm^3/ sec

Actual discharge, Q_{act} = 486.1 cm^3/sec

Results

Coefficient of discharge, C_d = Q_{act} / Q_{th} = 0.65

Graphical Solution

Slop, n = 2.45

k= 15

Coefficient of discharge, C_d= 0.65