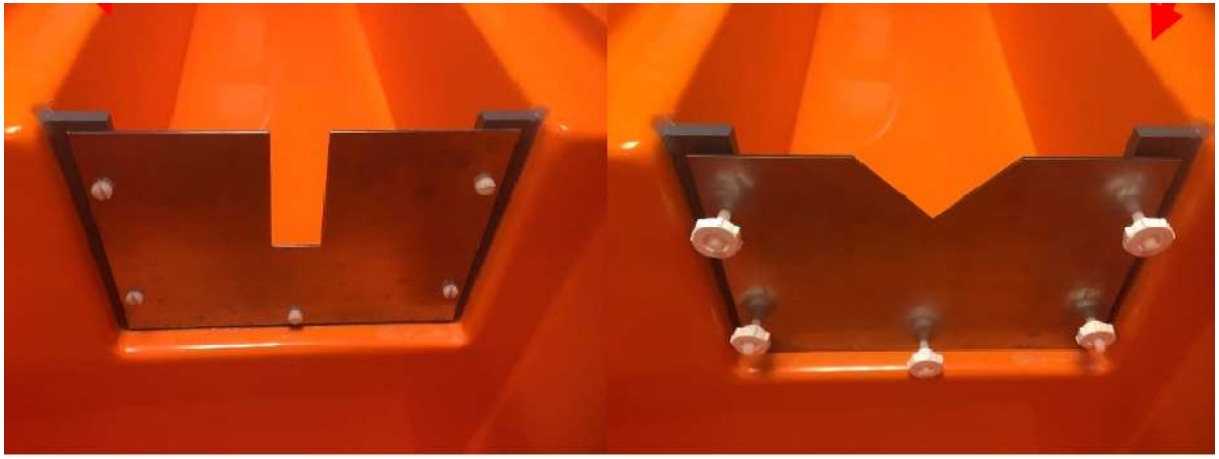
Experiment-6

Discharge over Weirs



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ENGI 2421

Content

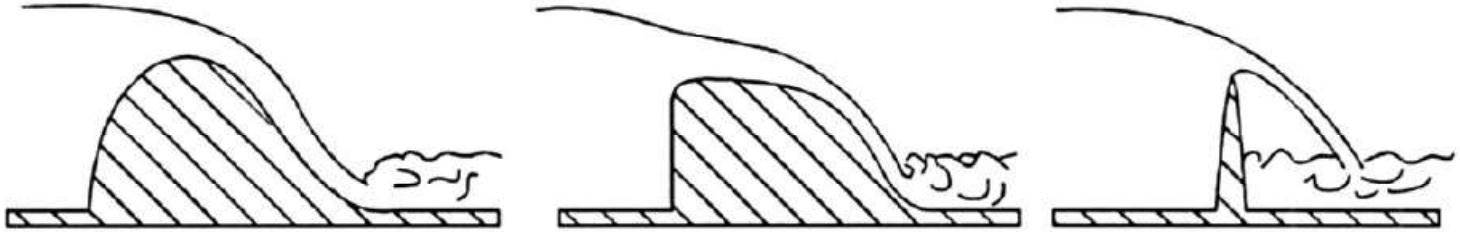
- Objective
- Theory
  - Introduction
  - Theory of Flow over Weirs

Objective

The objective of the present experiment is the experimental determination of discharge coefficient for a V-notch and rectangular weirs.

Introduction

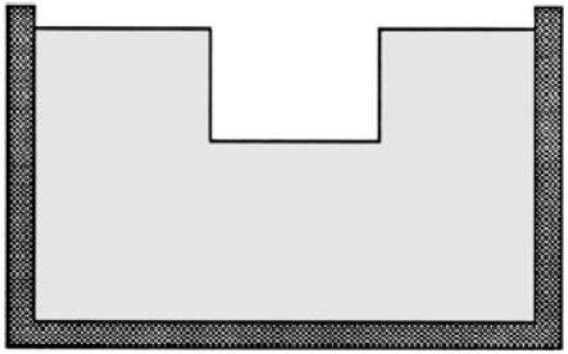
Example of various weir profiles



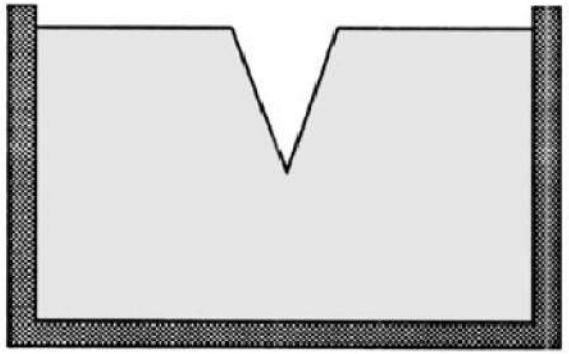
(a) Round crested (b) Broad crested (c) Sharp edged

Introduction

Front view of types of weirs



(a) Rectangular notch



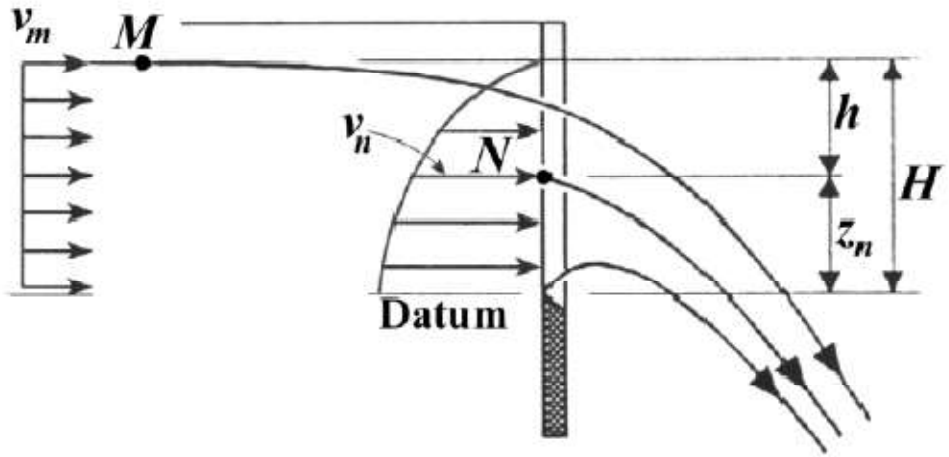
(b) V notch

Theory of Flow over Weirs

Velocity at point N

$$\frac{p_m}{\gamma}+\frac{v_m^2}{2g}+z_m=\frac{p_n}{\gamma}+\frac{v_n^2}{2g}+z_n$$

$$\Rightarrow \quad v_n=\sqrt{2gh}$$

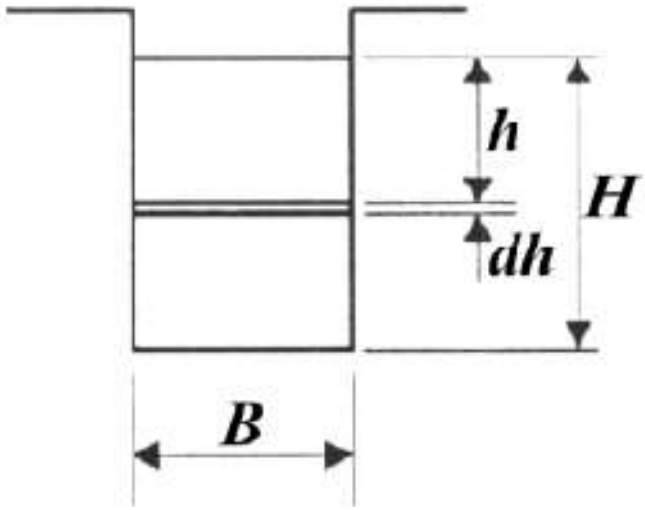


Theory of Flow over Weirs

Ideal volumetric flow rate, *Q*

$$dQ = v_n B dh$$

$$\Rightarrow \quad Q_{ideal} = \frac{2B}{3}\sqrt{2g}H^{3/2}$$



Actual volumetric flow rate, Q_a

$$Q_{actual} = C_d Q_{ideal}$$
$$= C_d \frac{2B}{3}\sqrt{2g}H^{3/2}$$

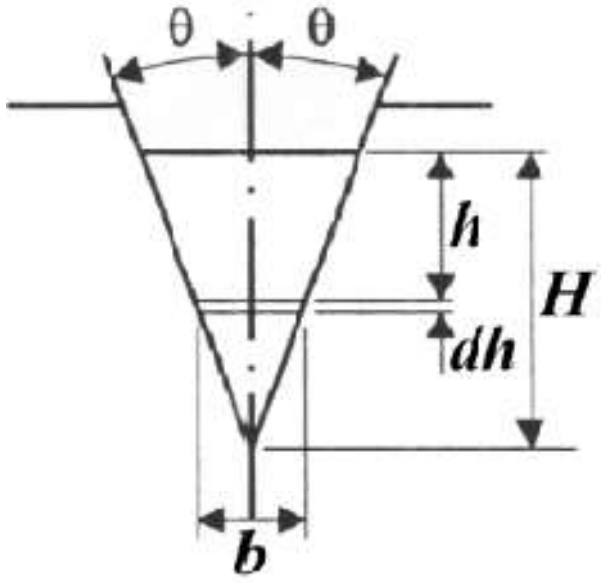
$$C_d = \frac{Q_{actual}}{Q_{ideal}}$$

Theory of Flow over Weirs

Ideal volumetric flow rate, Q

$$dQ = v_n b\,dh$$
$$= v_n 2(H-h)\tan\theta\,dh$$

$$\Rightarrow Q_{ideal} = \frac{8}{15}\sqrt{2g}\tan\theta\,H^{5/2}$$



$$b = 2(H\text{-}h)\tan\theta$$

Actual volumetric flow rate, Q_a

$$Q_{actual} = C_d Q_{ideal}$$
$$= C_d \frac{8}{15}\sqrt{2g}\tan\theta\,H^{5/2}$$

$$C_d = \frac{Q_{actual}}{Q_{ideal}}$$

Theory of Flow over Weirs