457.204 Elementary Fluid Mechanics and Lab.
Elementary Test

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ET 1: Flow over weirs

1. Objective

The objective of the weir is to block the channel to have water flow over the weir crest for flowrate measurement and increasing water surface elevation. The objective of this experiment is to determine the coefficient of discharge and construct the curve of water elevation-flowrate for a rectangular weir.

2. Theory

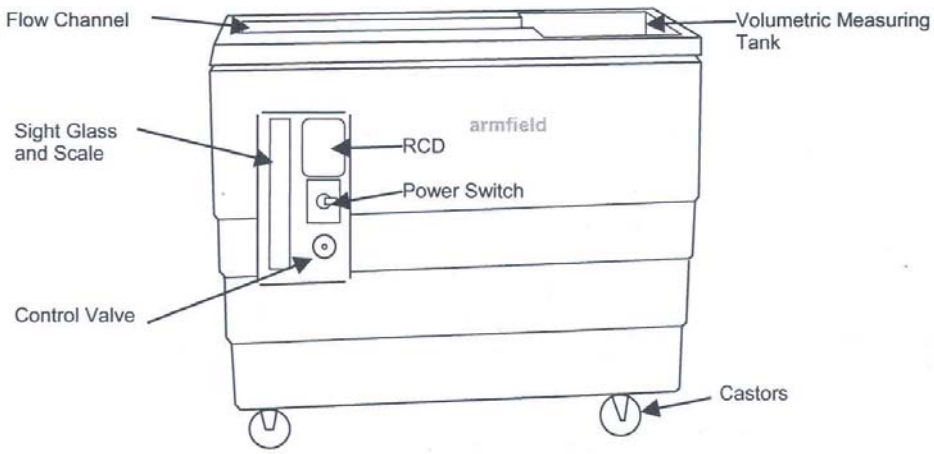
For the rectangular weir, the flowrate is given as

$$Q = C_d \frac{2}{3} B\sqrt{2g} H^{3/2}$$

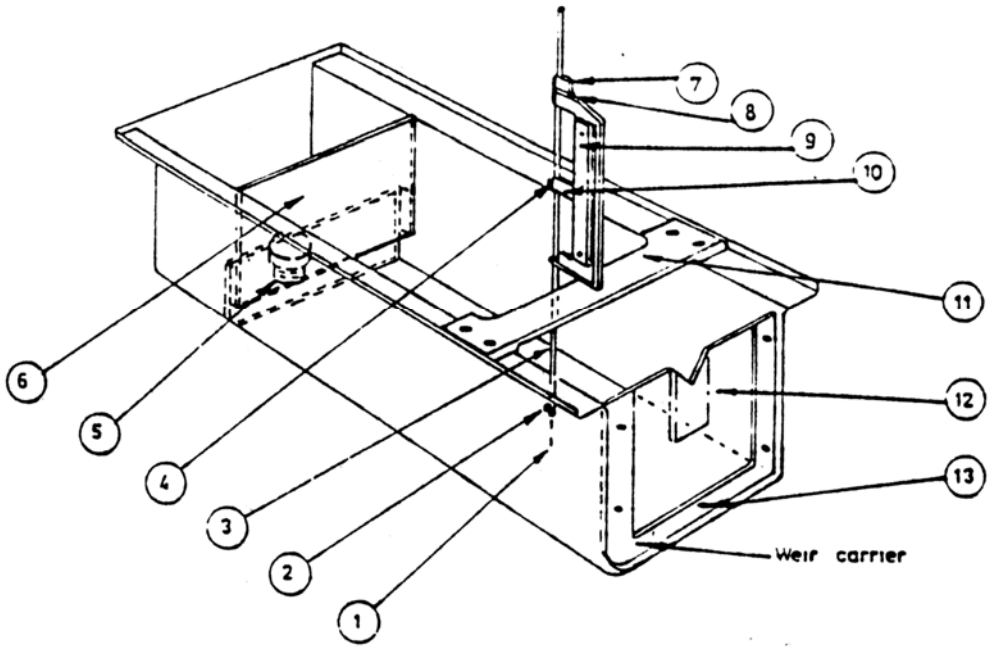
where C_d = coefficient of discharge; B = width of weir; H = head above bottom of notch.

3. Equipment Set-up

1) Hydraulics Bench



2) Rectangular Weir



①Point ②Screw C ③Sliding mast ④Screw B ⑤Deliver nozzle ⑥Stilling baffle ⑦Screw A ⑧Fine adjustment nut ⑨Scale ⑩Vernier ⑪Instrument carrier ⑫Weir plate ⑬Thumb nuts

4. Procedure

① Position the gauge about half way between the weir plate and stilling baffle.

② For each flowrate, stabilize conditions, and measure the H (from weir to water surface).

③ Take readings of volume and time using the volumetric tank to determine the flowrate.

④ Repeat above processes five times with increasing H in steps of 1 cm.

5. Results

① Is C_d constant for the conditions of the experiment?

② Estimate the average value of C_d for the range of the test.

③ Can the $Q-H$ relationship be described by an empirical formula $Q = kH^n$ If so, find values of k and n.

④ If C_d varies, suggest a functional relationship between C_d and H/B.