ASME International

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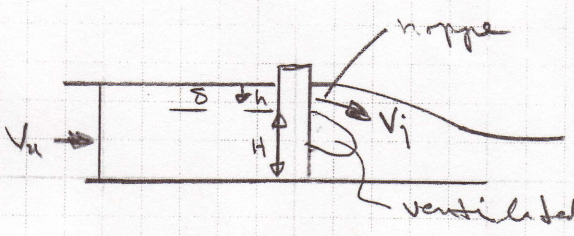
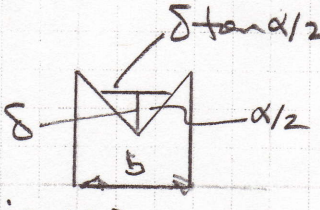
Bernoulli Analysis Notched Weir





Flow area = $\delta \times \delta \tan\theta/2$

$V_j \propto \sqrt{2g\delta}$

assume upstream $V << V_j$ & $p_j = 0$ ie V_j same as Torricelli velocity for free jet from reservoir

$$Q = C\,\delta^2 \tan\frac{\alpha}{2}\sqrt{2g\delta}$$

$$= C \tan\frac{\alpha}{2}\sqrt{2g}\,\delta^{5/2}$$

$$\frac{p_u}{\gamma} + \frac{V_u^2}{2g} + z_u = H + \delta - h + \frac{V_j^2}{2g}$$

$\delta + H + \frac{V_u^2}{2g}$ = total head at u

$$V_j^2 = \sqrt{2g\left(h + \frac{V_u^2}{2g}\right)}$$

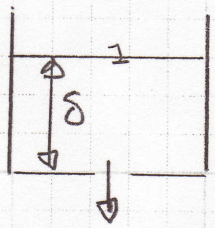
$$Q = \int V_j\, dA = \int_0^\delta V_j\, l\, dh$$

$l = b$ rectangular

$$Q = \frac{2}{3}\sqrt{2g}\, b\left[\left(\delta + \frac{V_u^2}{2g}\right)^{3/2} - \left(\frac{V_u^2}{2g}\right)^{3/2}\right]$$

$$= \frac{2}{3}\sqrt{2g}\, b\,\delta^{3/2} \quad H >> \delta$$

$$= C\frac{2}{3}\sqrt{2g}\, b\,\delta^{3/2} \quad \frac{V_u^2}{2g} << \delta$$



$V_j = \sqrt{2g\delta}$

$$\frac{p_1}{\gamma} + \frac{V_1^2}{2g} + \delta = \frac{p_j}{\gamma} + \frac{V_j^2}{2g} + 0$$

$l = 2(\delta - h)\tan\alpha/2$

$$Q = C\frac{8}{15}\tan\frac{\alpha}{2}\sqrt{2g}\,\delta^{5/2}$$

$C = C(Re, Fr, \delta/H)$

$\approx .611 + .075\,\delta/H$ rectangular

$\approx .58 - .62$ triangular