

$$Q = A_c \sqrt{\frac{2gh}{C_f}}$$

$$D_H = \frac{4A_c}{P_{wet}} \Rightarrow D = \sqrt{\frac{4A_c}{\pi}}$$

$$C_f = 1 + \frac{fL}{D_H}$$

$$A_c = \pi \frac{D_H^2}{4}$$