

1

$$W(r) = \frac{\pi L}{4\mu} (r^2 - R^2)$$

$$\bar{U} = \frac{\pi L R^2}{8\mu} = 3.065 \text{ m/s}$$

$$\bar{U} = \frac{\dot{m}}{\rho \pi d^2}$$

$$\pi L = 462895.8 \text{ Pa} \Rightarrow \Delta p = 610316 \text{ Pa}$$

2

$$U_1 = \sqrt{2gh}$$

$$Q_1 = 4 \text{ s}$$

$$\frac{P_1}{\rho} + gh = \frac{U_2^2}{2} + \frac{P_0}{\rho}$$

$$U_2 = \sqrt{2gh + \frac{2(P_1 - P_0)}{\rho}}$$

$$Q_2 = U_2 S = 3.1 U_1 S$$

$$U_2^2 = 9.61 U_1^2$$

$$2gh + \frac{2}{\rho}(P_1 - P_0) = 9.61 \cdot 2gh$$

$$P_1 = P_0 + 8.61 \rho gh = 313957.6 \text{ Pa}$$

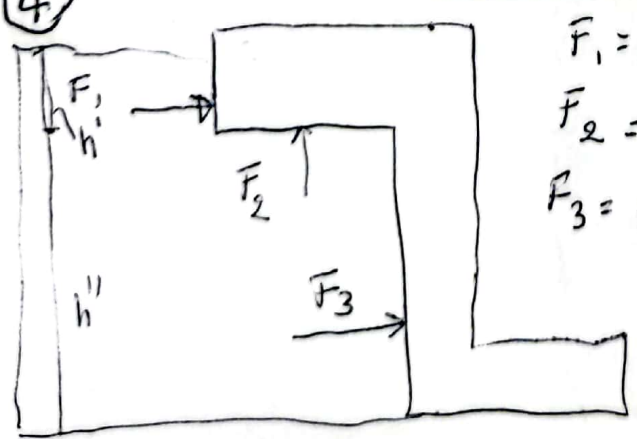
3

$$P = DV = \frac{1}{2} \rho U^3 S C_D$$

$$S S C_D = \frac{P}{U^3} = \frac{23520}{12255.4} = 1.919$$

$$P' = 168.4 \text{ kW} = 229 \text{ CV}$$

4



$$F_1 = \rho g \frac{h'}{2} b = 117606 \text{ N}$$

$$F_2 = \rho g h' L_1 b = 117606 \text{ N}$$

$$F_3 = \rho g (h' + \frac{h''}{2}) h'' b = 117606 \text{ N}$$

$$V = (L_1 H_1 + L_2 H_2 + L_3 H_3) \gamma$$

$$= 1.6 + 2.5 + 19.2$$

$$= 23.3 \text{ m}^3$$

$$F_1 + F_3 \leq (\rho g V - F_2) c$$

$$\frac{F_1 + F_3 + c F_2}{c \rho V} \leq \rho$$

$$\rho > 2408 \text{ kg/m}^3$$

$$h - (H_2 - H_1) = h' = 0.6 \text{ m}$$

$$h - h' = h'' = 4.2 \text{ m}$$