

April 2011

1.1)  $l = 750 \text{ mm}$

$d_1 = 100 \text{ mm}$

$d_2 = 175 \text{ mm}$

$Q = 0,05 \text{ m}^3/\text{s}$

$P_{r1} = 180 \text{ kPa}$

$$V_1 = \frac{Q}{A}$$

$$= \frac{0,05}{\frac{\pi}{4}(0,1^2)}$$

$$= 6,366 \text{ m/s}$$

$$= 6,366 \text{ m/s}$$

$$V_2 = \frac{0,05}{\frac{\pi}{4}(0,175^2)}$$

$$= 2,079 \text{ m/s}$$

$$\frac{P_{r1}}{\rho g} + \frac{V_1^2}{2g} = \frac{P_{r2}}{\rho g} + \frac{V_2^2}{2g} + \frac{k(V_1 - V_2)^2}{2g}$$

$$\frac{180 \text{ kPa}}{9810} + \frac{6,366^2}{19,62} = \frac{P_{r2}}{9810} + \frac{2,079^2}{19,62} + \frac{0,15(6,366 - 2,079)^2}{19,62}$$

$$\underline{P_{r2} = 196,724 \text{ kPa.}}$$

1.2)  $Q = 100 \text{ l/s}$

$P_{r1} = 150 \text{ kPa}$

$z_1 = 0,75 \text{ m}$

$$V_1 = \frac{Q}{A} = \frac{0,1}{\frac{\pi}{4}(0,1^2)}$$

$$= 12,73 \text{ m/s}$$

$$V_2 = \frac{0,1}{\frac{\pi}{4}(0,175^2)}$$

$$= 4,158 \text{ m/s}$$

$$z_1 + \frac{P_{r1}}{\rho g} + \frac{V_1^2}{19,62} = z_2 + \frac{P_{r2}}{\rho g} + \frac{V_2^2}{19,62} + \frac{k(V_1 - V_2)^2}{19,62}$$

$$0,75 + \frac{150 \text{ kPa}}{9810} + \frac{12,73^2}{19,62} = 0 + \frac{P_{r2}}{9810} + \frac{4,158^2}{19,62} + \frac{0,15(12,73 - 4,158)^2}{19,62}$$

$$\underline{P_{r2} = 224,229 \text{ kPa.}}$$