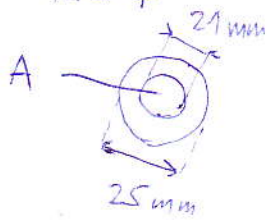


# 10-8 | část 1

$$\dot{m}_A = 1 \text{ kg/s} \quad t_{Ai} = 150^\circ\text{C} \quad t_{Ae} = 80^\circ\text{C}$$

$$m = 7 \quad t_{Bi} = 15^\circ\text{C} \quad t_{Be} = 25^\circ\text{C}$$



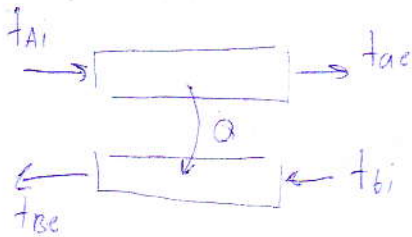
$$c_{pA} = 2 \frac{\text{kJ}}{\text{kg}\cdot\text{K}}$$

$$c_{pB} = 4,2 \frac{\text{kJ}}{\text{kg}\cdot\text{K}}$$

$$d_{ek} = \frac{4s}{\sigma}$$

$$D = 0,150 \text{ m}$$

$$\alpha_A = 1000 \text{ W/m}^2\cdot\text{K}$$



$$\dot{Q} = \dot{m}_A c_{pA} (t_{Ai} - t_{Ae}) = 1 \cdot 2 \cdot 70 = 140 \text{ kJ}$$

$$\dot{Q} = \dot{m}_B c_{pB} (t_{Be} - t_{Bi})$$

$$\dot{m}_B = \frac{140 \text{ kJ}}{4,2 \cdot (10)} = 3,33 \text{ kg/s}$$

$$S_B = \frac{\pi D^2}{4} - 7 \cdot \frac{\pi d^2}{4} = \frac{\pi \cdot 0,15^2}{4} - 7 \cdot \frac{\pi \cdot 0,025^2}{4} = 0,01424 \text{ m}^2$$

$$l_b = \pi D + 7 \cdot \pi d = \pi \cdot (0,15 + 7 \cdot 0,025) = 1,021 \text{ m}$$

$$d_{ek} = 0,05579 \text{ m}$$

$$v_B = \frac{\dot{m}_B / \rho}{S_B} = \frac{3,33 / 998,1}{0,01424} = 0,2343 \text{ m/s}$$

$$Re_B = \frac{v_B \cdot \rho_B \cdot d_{ek}}{\eta_B} = 13021$$

$$\bar{t}_B = 20^\circ\text{C}$$

$$Pr_B = 7,006$$

$$\rho_B = 998,1 \text{ kg/m}^3$$

$$Nu = 0,023 \cdot Re^{0,8} Pr^{0,4}$$

$$\eta_B = 1,002 \cdot 10^{-3} \text{ Pa}\cdot\text{s}$$

$$Nu = 98,09$$

$$\lambda = 0,5984 \text{ W/m}\cdot\text{K}$$

$$\alpha_B = \frac{Nu \cdot \lambda}{d_{ek}} = \frac{98,09 \cdot 0,5984}{0,05579} = 1052 \frac{\text{W}}{\text{m}^2\cdot\text{K}}$$

$$\alpha_A = 1000 \frac{\text{W}}{\text{m}^2\cdot\text{K}} \text{ (zadání)}$$

$$\lambda_{ocel} = 57 \text{ W/m}\cdot\text{K}$$

10-8 - část 2

$$K_L = \frac{\pi}{\frac{1}{\alpha_A d_A} + \frac{1}{2\lambda} \ln \frac{0,025}{0,021} + \frac{1}{\alpha_B d_B}} = \underline{\underline{35,93 \frac{W}{mK}}}$$

$$Q = K_L \cdot L \cdot \Delta T_{LS}$$

$$\Delta T_{LS} = \frac{(150 - 25) - (80 - 15)}{\ln \frac{150 - 25}{80 - 15}} = \frac{125 - 65}{\ln \frac{125}{65}} = 91,75 \text{ } ^\circ\text{C} \text{ } \cancel{\text{K}}$$

$$L = \frac{Q}{K_L \cdot \Delta T_{LS}} = \frac{140\,000}{35,93 \cdot 91,75} = 42,46 \text{ m (7 trubek)}$$

$$l_{\text{trubek}} = L/7 = \underline{\underline{6,07 \text{ m}}}$$

