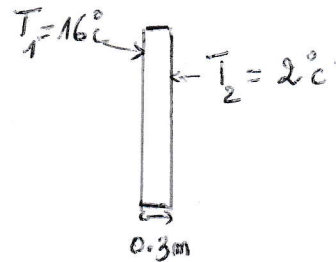
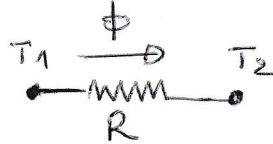


Exo 1: 2 Points

Il y a seulement conduction:

$$\phi = \frac{\Delta T}{R} = \frac{\Delta T}{\frac{L}{kS}} \text{ eppaisseur } \textcircled{1}$$



$$\phi = \frac{kS\Delta T}{L} = \frac{(0.9)(3 \times 5)(16-2)}{0.3} = 630 \text{ W} \textcircled{1}$$

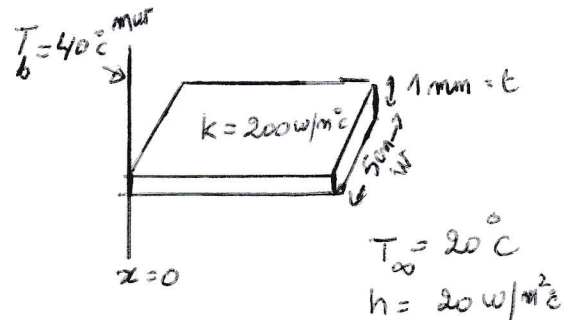
Exo 2: 4 Points

c'est le cas d'une ailette infinie:

Température:

$$\frac{\theta}{\theta_b} = \frac{T - T_\infty}{T_b - T_\infty} = e^{-mx} \text{ ; flux } \phi = M$$

$$m = \sqrt{\frac{hP}{kS_c}} = \left( \frac{20 \times 2(0.05 + 0.001)}{200(0.05 \times 0.001)} \right)^{\frac{1}{2}}$$



$$P = 2(w + e) \textcircled{1}$$

$$S = w \cdot e \textcircled{1}$$

$$m = 14.28 \textcircled{1} \quad \frac{T - T_\infty}{T_b - T_\infty} = \frac{T - 20}{40 - 20} = e^{-14.28 \times 0.05} \Rightarrow T = 20e^{-0.714} + 20 = 29.79 \textcircled{1}$$

$$\phi = \sqrt{hPKS_c} (T_b - T_\infty) = \left[ 20 \times (0.05 + 0.001) \times 2 \times 200 \times (0.05 \times 0.001) \right]^{\frac{1}{2}} (40 - 20) = 2.85 \text{ W} \textcircled{1}$$

Exo 3: 5 Points

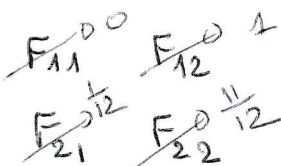
$$\tau = 1.5 = \frac{3CV}{hS} = \frac{3C \frac{\pi D^3}{6}}{hS} = \frac{3C \frac{\pi D^3}{6}}{h \pi D^2} = \frac{3CD}{6h} = D = \frac{6h\tau}{3C} = \frac{6 \times 4000 \times 1}{5000 \times 400} \textcircled{1}$$

$$Bi = \frac{hL_c}{k} = \frac{hD}{6k} = \frac{400 \times 0.0012}{6 \times 20} = 0.004 < 0.1 \rightarrow \text{Modèle Simple} \textcircled{1}$$

$$\frac{\theta}{\theta_c} = e^{-Bi} \Rightarrow t = -\tau \ln \left[ \frac{T - T_\infty}{T_c - T_\infty} \right] = -1 \ln \left[ \frac{199 - 200}{25 - 200} \right] = 5.16 \text{ s} \textcircled{1}$$

Exo 4: 9 Points

4 facteurs de forme

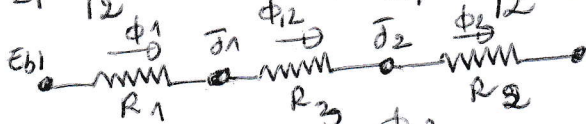


$F_{11} = 0 \rightarrow$  surface convexe

$F_{12} = 1 - F_{11} = 1 \rightarrow$  loi de la sommation

$$F_{21} = \frac{S_1}{S_2} F_{12} = \frac{S_1}{S_2} = \frac{4\pi R_1^2}{2\pi R_2^2 + \pi R_2^2} = \frac{4\pi R_1^2}{3\pi R_2^2} = \frac{4\pi r^2}{3\pi (4r)^2} \textcircled{1}$$

$$F_{22} = 1 - F_{21} = \frac{11}{12} \rightarrow \text{sommation} \textcircled{1} \quad ; \quad F_{21} = \frac{1}{3} \rightarrow \text{loi de la réciprocité} \textcircled{1}$$



corps noirs  $\epsilon_1 = \epsilon_2 = 1 \Rightarrow R_1 = R_2 = 0$

$$\phi_{12} = \frac{5(T_1^4 - T_2^4)}{4\pi R_2^2 \times F_{12}} = \frac{5(323^4 - 300^4)}{4\pi (4)^2 \times \frac{1}{3}} = 1983.01 \text{ W} \textcircled{1}$$