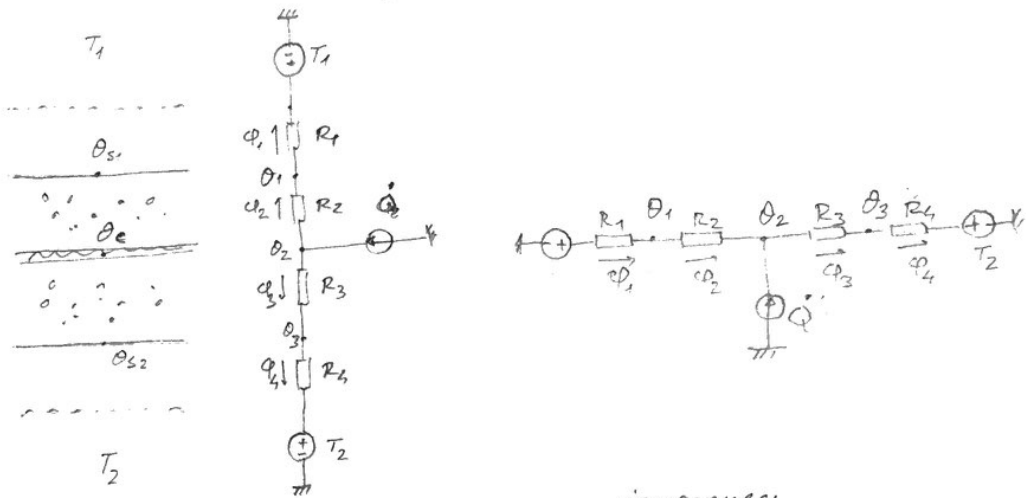




(1)



inconnues:

Données:  $h_1, h_2, \lambda_e, e_e, e_c, T_1, T_2, \dot{Q}$        $\theta_1, \theta_2, \theta_3, q_1, q_2$

$$R_1 = \frac{1}{h_1}; \quad R_2 = \frac{(e_e - e_c) \lambda_e}{\lambda_e}; \quad R_3 = R_2; \quad R_4 = \frac{1}{h_2}$$

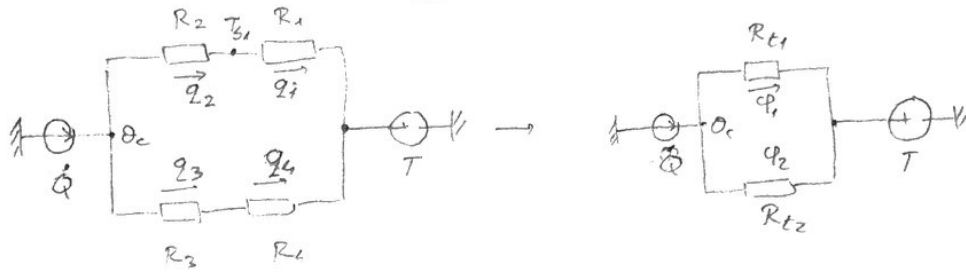
$$A = \begin{bmatrix} \theta_1 & \theta_2 & \theta_3 \\ q_1 & -1 & 0 & 0 \\ q_2 & 1 & -1 & 0 \\ q_3 & 0 & -1 & 1 \\ q_4 & 0 & 0 & -1 \end{bmatrix} \quad G = \begin{bmatrix} R_1^{-1} & 0 & 0 & 0 \\ 0 & R_2^{-1} & 0 & 0 \\ 0 & 0 & R_3^{-1} & 0 \\ 0 & 0 & 0 & R_4^{-1} \end{bmatrix} \quad \ell = \begin{bmatrix} -T_1 \\ 0 \\ -T_2 \end{bmatrix}$$

$$f = [0 \quad \dot{Q} \quad 0]^T$$

$$\theta = (A^T G A)^{-1} (A^T G \ell + f) = \begin{bmatrix} \theta_1 & \theta_2 & \theta_3 \\ 28,45 & 32,44 & 29,52 \end{bmatrix} \text{ } ^\circ\text{C}$$

$$Q = G (-A \theta + \ell) = \begin{bmatrix} q_1 & q_2 \\ 58,53 & 41,47 \end{bmatrix} \text{ W/m}^2$$

(2)



$$R_{t1} = R_1 + R_2 = \frac{x}{\lambda b} + \frac{1}{h_1}$$

$$R_{t2} = R_3 + R_4 = \frac{(e_b - x - e_c)}{\lambda b} + \frac{1}{h_2}$$

Données:

$e_b, e_c, \lambda b, h_1, h_2, T_1 = T_2$

inconnues

$x, \varphi_2$

$$\left. \begin{aligned} \varphi_1 &= \frac{1}{R_{t1}} (\theta_c - T) \\ \varphi_2 &= \frac{1}{R_{t2}} (\theta_c - T) \end{aligned} \right\} \Rightarrow \begin{cases} \varphi_1 R_{t1} = \varphi_2 R_{t2} \\ \varphi_1 + \varphi_2 = \dot{Q} \\ \varphi_1 = h_1 (T_{s1} - T) \end{cases}$$

$$\varphi_1 \left( \frac{x}{\lambda b} + \frac{1}{h_1} \right) = \varphi_2 \left( \frac{e_b - x - e_c}{\lambda b} + \frac{1}{h_2} \right)$$

$$\varphi_1 \left( \frac{x}{\lambda b} + \frac{1}{h_1} \right) = (\dot{Q} - \varphi_1) \left( \frac{e_b - x - e_c}{\lambda b} + \frac{1}{h_2} \right)$$

$$\frac{\varphi_1}{\lambda b} \left( x + \frac{\lambda b}{h_1} \right) = \frac{\dot{Q} - \varphi_1}{\lambda b} \left( e_b - x - e_c + \frac{\lambda b}{h_2} \right)$$

$$x + \frac{\lambda b}{h_1} = \left( \frac{\dot{Q} - \varphi_1}{\varphi_1} \right) \left( e_b - x - e_c + \frac{\lambda b}{h_2} \right)$$

$$x \left( 1 + \frac{\dot{Q} - \varphi_1}{\varphi_1} \right) = \frac{\dot{Q} - \varphi_1}{\varphi_1} \left( e_b + e_c + \frac{\lambda b}{h_2} \right) - \frac{\lambda b}{h_1}$$

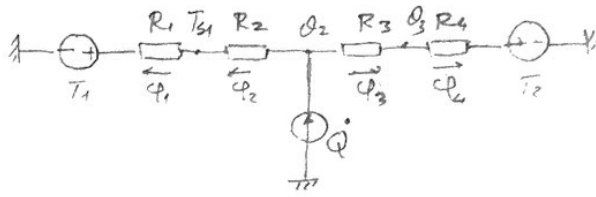
$$x \left( 1 + \frac{\dot{Q}}{\varphi_1} - 1 \right) = \left( \frac{\dot{Q}}{\varphi_1} - 1 \right) \left( e_b + e_c + \frac{\lambda b}{h_2} \right) - \frac{\lambda b}{h_1}$$

$$x = \frac{\varphi_1}{\dot{Q}} \left( \frac{\dot{Q}}{\varphi_1} - 1 \right) \left( e_b + e_c + \frac{\lambda b}{h_2} \right) - \frac{\varphi_1}{\dot{Q}} \cdot \frac{\lambda b}{h_1}$$

$$x = \left( 1 - \frac{\varphi_1}{\dot{Q}} \right) \left( e_b + e_c + \frac{\lambda b}{h_2} \right) - \frac{\varphi_1}{\dot{Q}} \cdot \frac{\lambda b}{h_1} ; \varphi_1 = h_1 (T_{s1} - T)$$

$$x = 0,2489 \text{ m}$$

(3)



Données :  $h_1$   $h_2$   $\lambda l$   $e_c$   $e_c$   $T_1$   $T_2$   $\theta_1$

Inconnue :  $\dot{Q}$

$$\phi_1 = h_1 (T_{S1} - T_1) = 35,60 \frac{W}{m^2}$$

$$\phi_1 = \phi_2 = \frac{\lambda l}{(e_c - e_c)/2} (\theta_2 - \theta_1) \Rightarrow \theta_2 = T_{S1} + \frac{e_c - e_c}{2 \lambda l} \phi_2$$

$$\phi_3 = \frac{1}{\frac{(e_c - e_c)/2}{\lambda} + \frac{1}{h_2}} (\theta_2 - T_2) = 23,80 \frac{W}{m^2}$$

$$\phi = \phi_1 + \phi_3 = 57,40 \frac{W}{m^2}$$