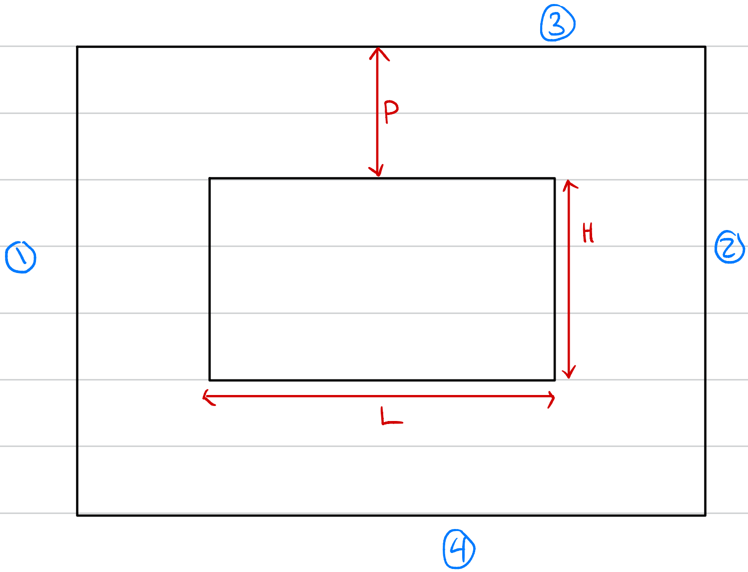
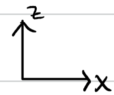
Physique du problème





$$\alpha \nabla^2 T = \frac{\partial T}{\partial t}$$

$$\Rightarrow \quad \frac{\partial^2 T}{\partial x^2} + \frac{\partial^2 T}{\partial z^2} - \frac{1}{\alpha} \cdot \frac{\partial T}{\partial t} - g(x,z,t) = 0$$

On considère aucune source $\quad g(x,z,t) = 0$

Conditions frontières

1) $\vec{n} \cdot \nabla T = 0$ 2) $\vec{n} \cdot \nabla T = 0$

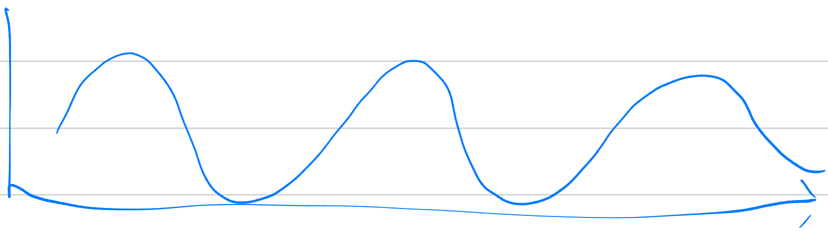
3) $\sigma T^4 = S(t)$ $T = \frac{S(t)}{\sigma T_{moy}^3}$

4) ? ?   Quelle est la 4e C.F.

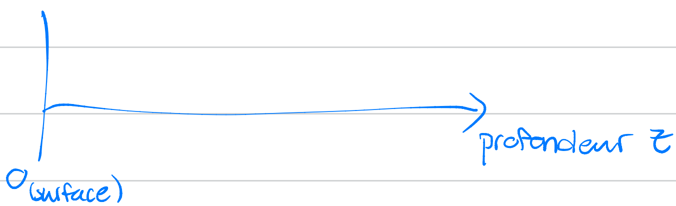
Définition de $S(t)$

On sait que le soleil fournit $P\,(W/m^2)$

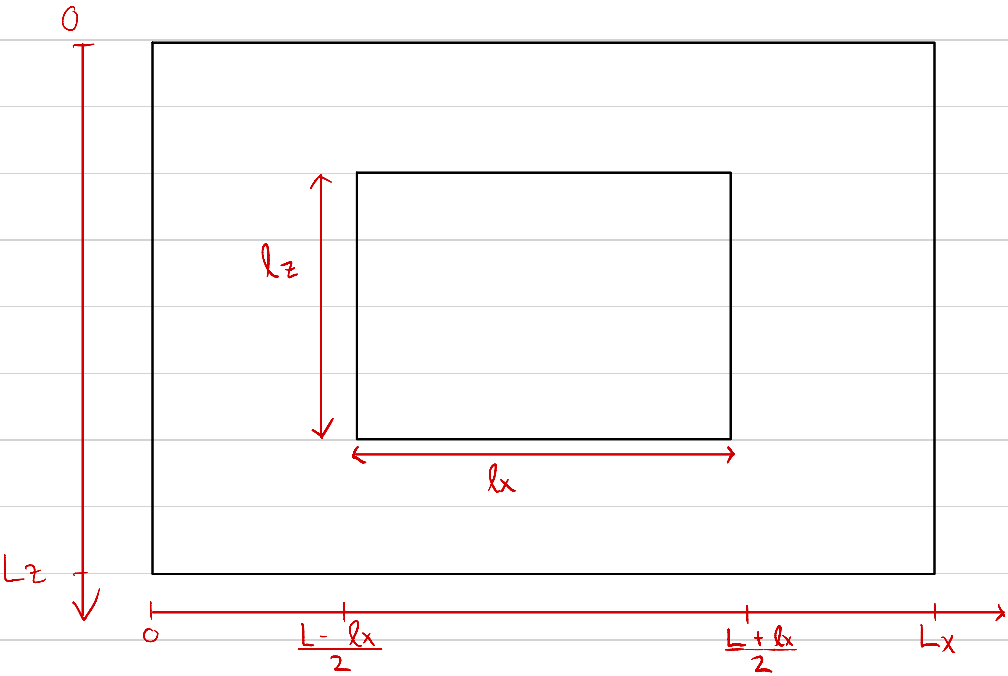
$$Q = Q_0 + \overset{\overset{Q_0}{\uparrow}}{A}\,\sin\left(\frac{2\pi t}{T}\right)$$



$$\alpha \frac{\partial^2 T}{\partial z^2} = \frac{\partial T}{\partial t}$$



$$\sigma T^4 \big|_{0=z} = S(t)$$



si $0 < x < \frac{L-l_x}{2}$ ou $\frac{L+l_x}{2} < x < L_x$ and $0 < z < \frac{L-l_z}{2}$ ou $0 < z < \frac{L+l_z}{2}$

$$T_{i,j-1} + T_{i,j+1} - 4T_{i,j} + T_{i-1,j} + T_{i+1,j} = 0$$

si $\frac{L-l_x}{2} < x < \frac{L-l_x}{2}$ and $\frac{L-l_z}{2} < z < \frac{L+l_z}{2}$

$$T_{i,j} = 394 \text{ K}$$

C.F. numériques

$\underline{x = 0 \quad : \quad \frac{\partial T}{\partial x} = 0}$

$-3T_{i,j} + 4T_{i,j+1} - T_{i,j+2} = 0$

$\underline{x = L_x \quad \frac{\partial T}{\partial x} = 0}$

$T_{i,j-2} - 4T_{i,j-1} + 3T_{i,j} = 0$

$\underline{z = 0 \quad -K\frac{\partial T}{\partial z} = S(t) - \sigma T^4}$

$$-\frac{K}{2h}\left(-3T_{i,j} + 4T_{i,j+1} - T_{i,j+2}\right) = S(t) - \sigma T_{i,j}\, T_{moy}^3$$

$$-3T_{i,j} + 4T_{i,j+1} - T_{i,j+2} = \frac{-2h}{K}S(t) + \frac{2h\sigma}{K}T_{i,j}\,T_{moy}^3$$

$$\left(-3 - \frac{2h\sigma}{K}T_{moy}^3\right)T_{i,j} + 4T_{i+1,j} - T_{i+2,j} = \frac{-2h}{K}S(t)$$

$\underline{z = L_z}$

$T_{i,j} = T_s$

$\underline{\text{autre}}$

$T_{i,j-1} + T_{i,j+1} - 4T_{i,j} + T_{i-1,j} + T_{i+1,j} = 0$

$\underline{z > p \quad z < p + l_z \quad x < \frac{l_z}{2}}$

$T_{i,j} = 394$

$x = (j-1)d \qquad z = (i-1)d$

$\frac{x}{d} + 1 = j \qquad \frac{z}{d} + 1 = i$