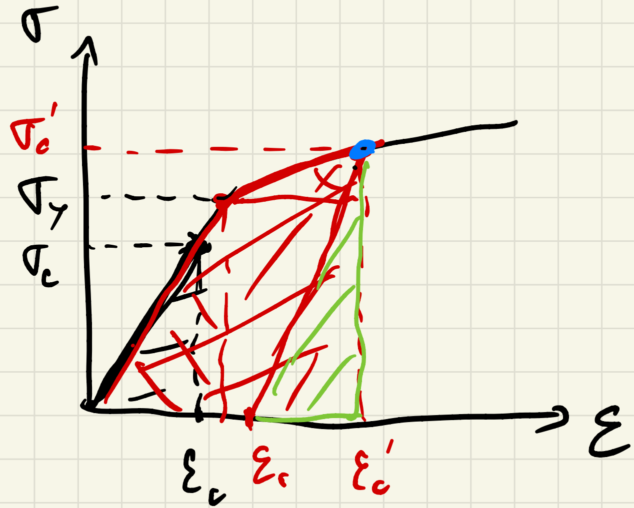
Question : energie restituée et dissipée ?



élastique densité d'énergie $w = \frac{1}{2}\sigma_{xx}\varepsilon_{xx}$
J/m³

$w = \frac{1}{2}\sigma_{xx}\varepsilon_{xx}$

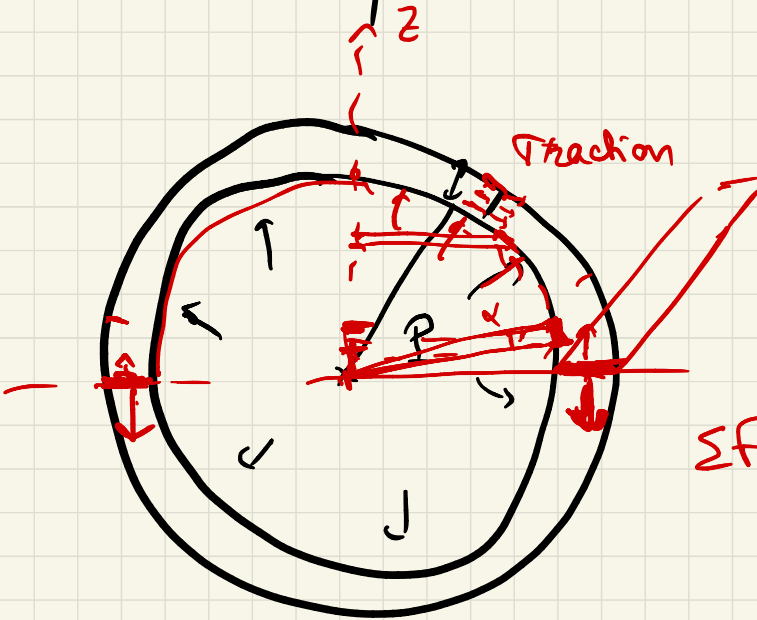
Si plastique

Aire sous la courbe : géométrie
triangle + trapèze

en vert : énergie rendue

Energie totale en J : $W = \underset{J/m^3}{w} \times V(m^3)$

Tube sous pression.

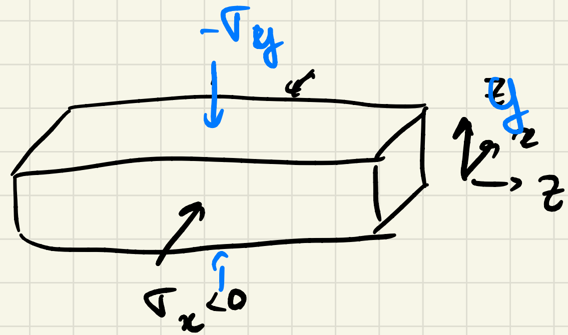


$$\sigma_T = \frac{F_T}{S}$$

$$\frac{F}{S} = \frac{F}{eL}$$

éq. forces sur axes z — demi cylindre coque du dessus

$$\sum F = 0 = -2F + \int_0^{180} P.R \sin\alpha \, d\alpha$$



$\varepsilon_{yy} = -\nu\,\varepsilon_{xx}$

appliqué : $\underbrace{-\sigma}$ sur x $\qquad \sigma_{xx} = E\,\varepsilon_{xx}$

$$\begin{cases} \varepsilon_{xx} = -\dfrac{\sigma}{E} \\ \varepsilon_{yy} = -\nu\,\varepsilon_{xx} = +\nu\dfrac{\sigma}{E} \\ \varepsilon_{zz} = \nu\dfrac{\sigma}{E} \end{cases}$$

$$L_{yy}' = L_{yy} + \Delta L_{yy} = L_{yy} + L_{yy}\,\varepsilon_{yy}$$

2e chargement : $\cancel{\varepsilon_{yy}'' = -\dfrac{\sigma_{yy}}{E}}$

$$L_{yy}'' = L_{yy}' + \Delta L_{yy}'' = L_{yy}' + L_{yy}'\,\varepsilon_{yy}''$$

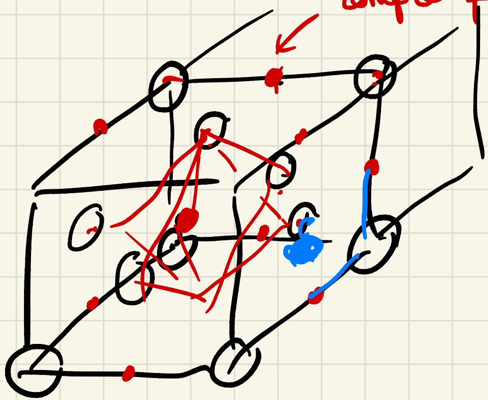
$$= \underbrace{L_{yy}'}\left(1 + \frac{-\sigma}{E}\right)$$

$$= L_{yy}(1+\varepsilon_{yy})\left(1 - \frac{\sigma^*}{E}\right)$$

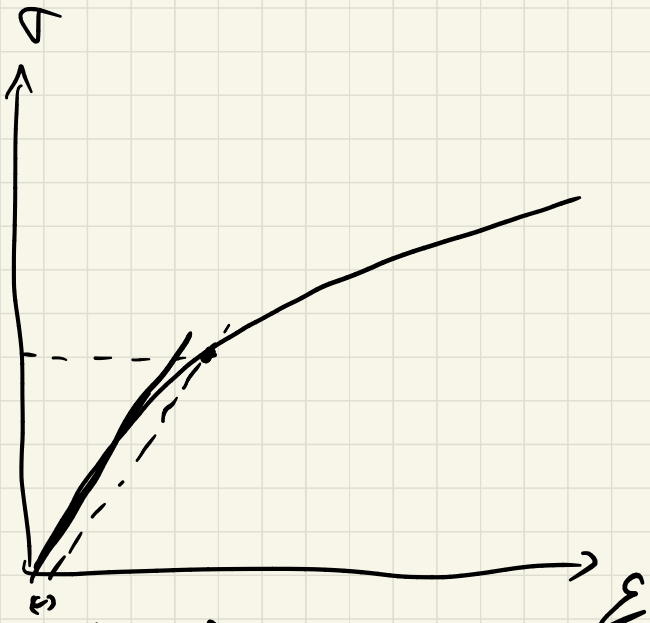
$$= L_{yy}\left(1+\nu\frac{\sigma}{E}\right)\left(1-\frac{\sigma}{E}\right)$$

Sites octaédriques

compte pour $1/4 \times 12 = 3$



- le milieu → 1 site
-



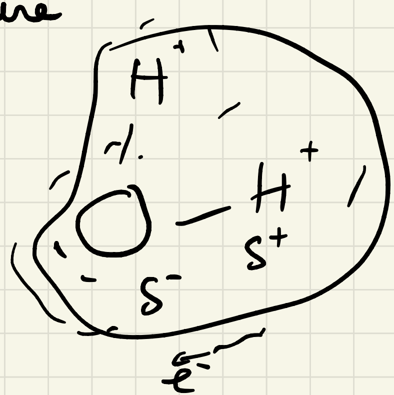
Metal 0.2% de def.

Polym. 0.5% de def

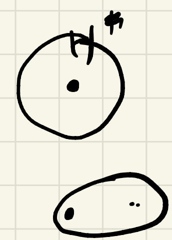
Laison covalente polaire ?

$0.4 < \Delta E_N < 1.7$

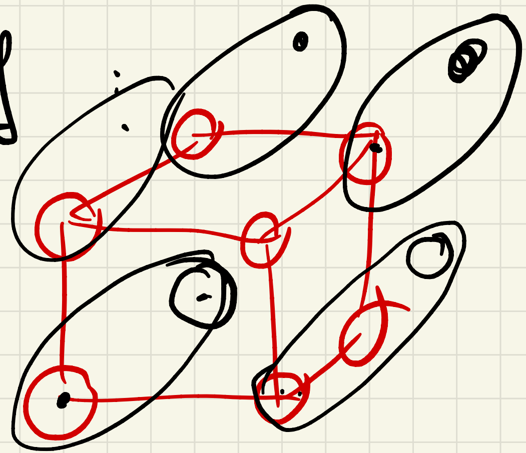
covalente
polaire



transfert



Motif



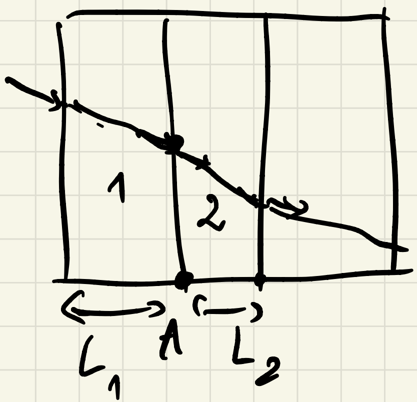
AB

Maille à partir du rouge

C simple.

Résistance thermique

$\dot{Q}$



$\dot{Q}$ transmis Aire × j/m^2

$$\dot{Q} = A J_T = A \frac{k_T \Delta T_{total}}{L_{tot}} \rightarrow \Delta T_{tot} = J_T \frac{L_T}{k_T}$$

$$J_T = J_T(A) = J_T(B)$$

en A $\quad J_{A^-} = J_{A^+}$

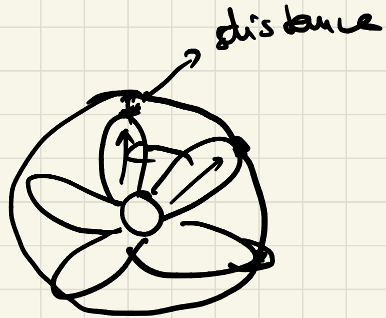
$$-k_1 \frac{\Delta T_1}{L_1} = -k_2 \frac{\Delta T_2}{L_2} \dots = J_T$$

$$\Delta T_1 + \Delta T_2 + \Delta T_3 = \Delta T_{total}$$

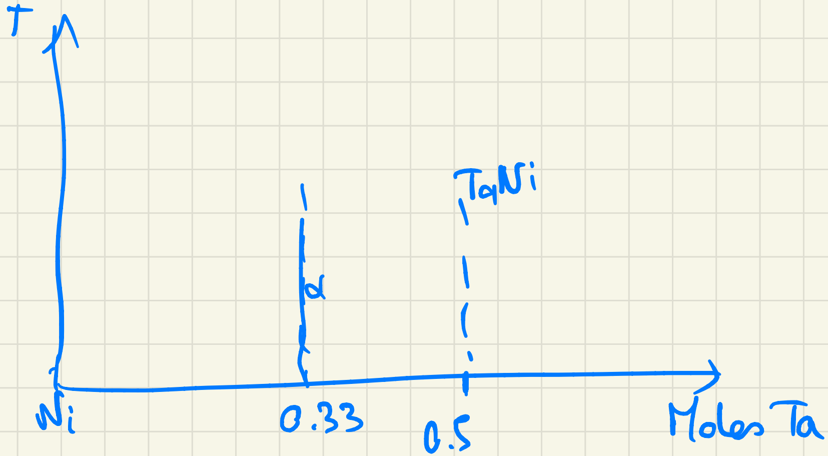
$\frac{E}{\rho}$ Rigidité
Mass volume

Dilat. Thermiq $\quad \varepsilon_T = \alpha \Delta T < \varepsilon_{mé}$ pour 100kg $= \frac{\sigma_{100kg}}{E}$

$\sigma_{100} = E\, \varepsilon_{mé}$



Phase α



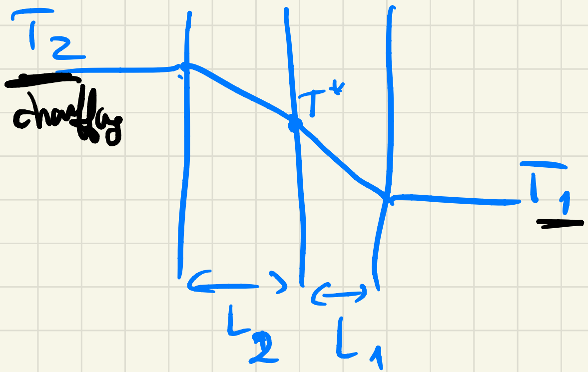
$X = 0.33$ de Ta molaire

1 Ta pour 2 de Ni $\rightarrow$ Ni_2Ta

__stationnaire__ : dépend pas du temps

directement $J_1 = -\frac{k_1 \Delta T}{L_1}$

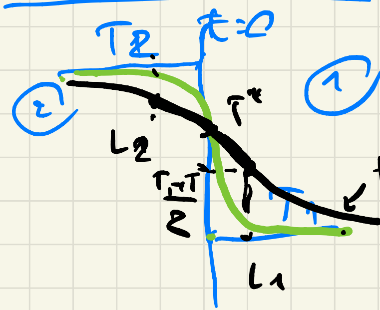
$J_2 = -\frac{k_2 \Delta T}{L_2}$



$$J_1 = \frac{-k_1 \frac{T_1 + T^*}{2}}{\sqrt{a_1 t}}$$

$J_2 \ldots$

__Pas stationnaire__ Profil dépend du temps



temps différents

t donné $J_1 = -\frac{k_1 \Delta T}{\underbrace{L_1}}$ à $\frac{T_1+T^*}{2}$ vaut $\sqrt{a_1 t}$

$\Delta T \rightarrow \frac{T_1+T^*}{2}$