TH3.22 – Réchauffons la brioche

1 - Puissance évacuée = puissance absorbée en régime permanent.

$$\boxed{\phi(R) = p \cdot \frac{4}{3}\pi R^3}$$

2 - $0 = \lambda \Delta T + p$ $\qquad \left(\rho c \frac{\partial T}{\partial t} = \lambda \Delta T + p\right)$

3 - $\Delta T = -\frac{p}{\lambda}$

Symétrie sphérique : $T(r)$ $\longrightarrow$ $\Delta T = \frac{1}{r^2}\frac{d}{dr}\left(r^2 \frac{dT}{dr}\right)$

$$\frac{d}{dr}\left(r^2 \frac{dT}{dr}\right) = -\frac{p}{\lambda} r^2 \xrightarrow{\int} r^2 \frac{dT}{dr} = -\frac{p}{3\lambda} r^3 + A$$

$\frac{dT}{dr} = -\frac{p}{3\lambda} r + \frac{A}{r^2}$ Diverge si $r \to 0$ $\Rightarrow A = 0$

$$\frac{dT}{dr} = -\frac{pr}{3\lambda}$$

inutile

$\Bigg($ CL : $\phi(R) = \oiint_{(B)} \vec{j} \cdot d\vec{S} = -\lambda \frac{dT}{dr}(R) \cdot 4\pi R^2 \longrightarrow \frac{dT}{dr}(R) = -\frac{\phi}{4\pi R^2 \lambda} = -\frac{p}{3\lambda} R$

$\frac{dT}{dr}(R) = -\frac{pR}{3\lambda}$ $\Bigg)$

$$T = -\frac{p}{3\lambda} r^2 + C$$

CL : $T(R) = T_0 \longrightarrow T_0 = -\frac{pR^2}{3\lambda} + C \longrightarrow C = T_0 + \frac{pR^2}{3\lambda}$

$$\Rightarrow \boxed{T(r) = T_0 + \frac{p}{3\lambda}(R^2 - r^2)}$$

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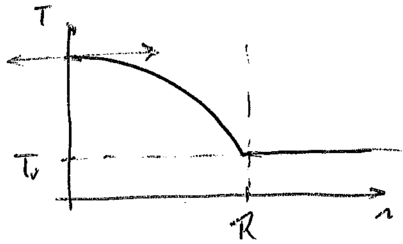

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