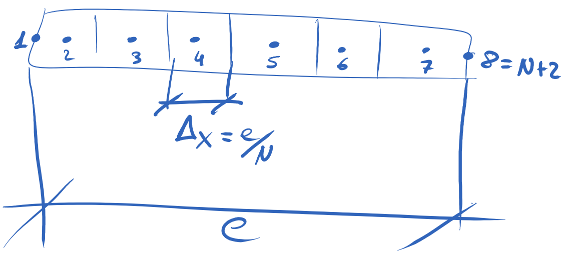
Ex1 19/10/22 V02

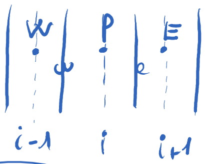
miércoles, 19 de octubre de 2022 20:19

Input data

Physical : $e, H, W, \lambda(T), T_A, T_B, \alpha_A, \alpha_B, \dot{q}_v(T)$

Numerical : $N, \delta, T_{initial}$





N+2 Nodes
N+1 Faces

$X_w[i] = (i-1)\cdot\Delta x$
From i = 1 to i = N+1

$X_p[1] = 0$

$X_p[N+2] = e$

$X_p[i] = \dfrac{X_w[i] + X_w[i-1]}{2}$

From i=2 to = N+1

Previous Calculations

Also → $V_{p[i]}$ ...

And initial T mapping

$$a_{p[i]} T_{[i]} = a_{w[i]} T_{[i-1]} + a_{E[i]} T_{[i+1]} + b_{p[i]}$$

$$\left(\frac{\lambda_w S_w}{d_{pw}} + \frac{\lambda_e S_e}{d_{pE}}\right) T_p = \frac{\lambda_w S_w}{d_{pw}} T_w + \frac{\lambda_e S_e}{d_{pE}} T_E + \dot{q}_v \rho V_p$$

First code we asume λ = constant

$$\dot{q}_{conv} = \dot{q}_{cond}$$

$$\alpha_A (T_A - T_p) = -\lambda \left.\frac{dT}{dx}\right|_e \approx -\lambda_e \frac{T_E - T_p}{d_{pE}}$$

here we don't need Surface Area

$$\underbrace{\left(\frac{\lambda_e}{d_{pE}} + \alpha_A\right)}_{a_p} T_p = \underbrace{\frac{\lambda_e}{d_{pE}}}_{a_E} T_E + \underbrace{\alpha_A T_p}_{b_p}$$

$$a_p T_p = a_E T_E + b_p$$

$$a_{p[i]} T_{[i]} = a_{E[i]} T_{[i+1]} + b_{p[i]}$$

$$a_{p[1]} T_{[1]} = a_{E[1]} T_{[2]} + b_{p[1]}$$

Gauss - Seidel $\longrightarrow$ revisar usar GPU cores en Python

$\lambda[i] = \lambda(T[i])$

$\dot{q}_v[i] = \dot{q}_v(T[i])$

Now the heat flux and the Conduction heat transfer Coefficient are dependent from the Temperature.

Esto lo haré más Tarde...

$\max |T^*[i] - T[i]| < \delta$? $\xrightarrow{\text{No?}}$ recalculate Discretization Coefficients and Temp.

$\downarrow$ Yes

Final Calculations