Heat transfer in solids: remarks

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Model definition (page 2)

- Why do we use such a simple 1D model and not a 3D model (every slab is 3D in reality)?
- What are the ranges of the variables?

  $T_0 > T_1$ (pre-confition) => $T_0 \geq T \geq T_1$ (causality)

  => $0 = \Theta(T = T_1) > \Theta(T) > \Theta(T = T_0) = 1$

  $-1 \leq \eta = \frac{x}{b} \leq 1$

- thermal diffusivity

  $\alpha = \frac{k}{C_p \rho}$ unit $\frac{\mathrm{m}^2}{\mathrm{s}}$ (SI) => $\tau = \frac{\alpha}{b^2} t$ is unitless

- general equation

  $\frac{\partial T}{\partial t} = \alpha \nabla^2 T$ with $T = T(\boldsymbol{r}, t)$

  here $\Theta = \Theta(\eta, \tau)$

Modeling instructions (page 4)

- Component I → coordinates -1 and 1 (page 5)
- step function needed
- leave integration (page 5)
- Set $k = C_p = \rho = 1$ is the same as setting $\alpha = 1$ (page 7)
- To get Temperature 1: right click “Heat transfer in solids” → Temperature 1
- Solution 1 (sol 1): right-click to get to “show default solver”