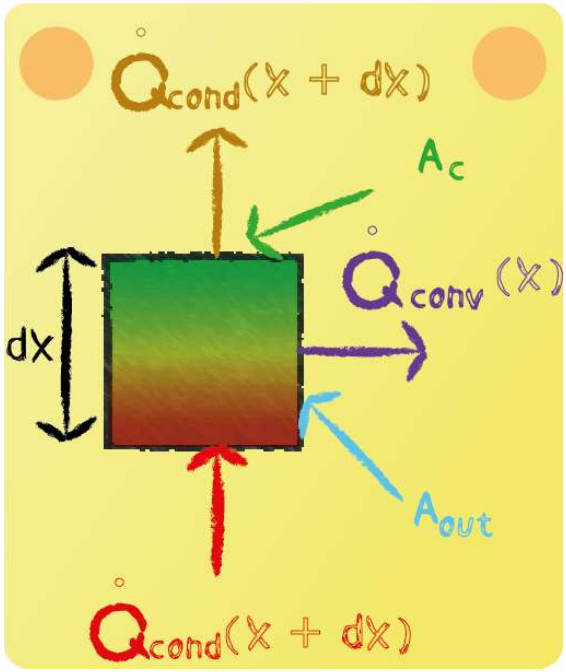
Lecture 9 - Question 5



For the derivation of the fin differential equation the energy balance of in- and outgoing fluxes are used. What is the unit of the fin differential equation, check whether the right and left side have the same unit.

$$\lambda \cdot A_C \cdot \frac{\partial^2 T}{\partial x^2} = \alpha \cdot U \cdot (T(x) - T_A)$$

$$\left[\lambda \cdot A_C \cdot \frac{\partial^2 T}{\partial x^2}\right] = (W^1 m^{-1} K^{-1}) \cdot (W^0 m^2 K^0) \cdot (W^0 m^{-2} K^1) = W^1 m^{-1} = J^1 s^{-1} m^{-1}$$

$$[\alpha \cdot U \cdot (T(x) - T_A)] = (W^1 m^{-2} K^{-1}) \cdot (W^0 m^1 K^0) \cdot (W^0 m^0 K^1) = J^1 s^{-1} m^{-1}$$

So they have the same units.