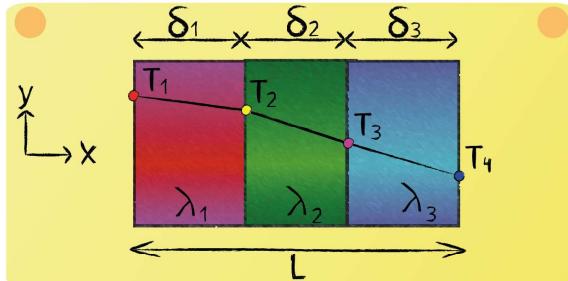


Lecture 4 - Question 6



Give the energy balance and describe the heat fluxes. Assume one-dimensional steady state heat transfer.

Energy Balance:

$$\dot{Q}_{in} - \dot{Q}_{out} = 0$$

Heat fluxes:

$$\dot{Q}_{in} = -\lambda_1 A \frac{1}{\delta_1} (T_2 - T_1)$$

$$\dot{Q}_{in} = -\lambda_2 A \frac{1}{\delta_2} (T_3 - T_2)$$

$$\dot{Q}_{in} = -\lambda_3 A \frac{1}{\delta_3} (T_4 - T_3)$$

$$\dot{Q}_{out} = -\lambda_1 A \frac{1}{\delta_1} (T_2 - T_1)$$

$$\dot{Q}_{out} = -\lambda_2 A \frac{1}{\delta_2} (T_3 - T_2)$$

$$\dot{Q}_{out} = -\lambda_3 A \frac{1}{\delta_3} (T_4 - T_3)$$



The in-and outgoing heat fluxes can be described in multiple ways for this case. Since steady-state conduction is the only type of heat transfer for this case, it is important to keep in mind that, accordingly to the energy balance, the in- and outgoing heat flux for each layer should always equal each other. This in order to maintain energy conservation.

