

Lecture 4 - Question 7



Give the energy balance and describe the heat fluxes. Assume one-dimensional steady state heat transfer. Assume T_1 to be higher than T_4 .

Energy balance:

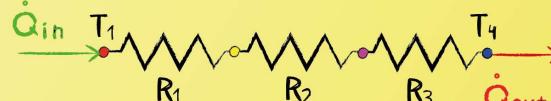
$$\dot{Q}_{in} - \dot{Q}_{out} = 0$$

Heat fluxes:

$$\dot{Q}_{in} = (T_1 - T_4)/(R_1 + R_2 + R_3)$$

$$\dot{Q}_{out} = (T_1 - T_4)/(R_1 + R_2 + R_3)$$

In order to obtain the steady-state energy balance, the sum of the in and out-going heat fluxes should equal zero. The flow direction of the energy is in the same direction as the temperature drop. The magnitude of the heat flux going in and out depends on the difference in temperature as well as on the thermal resistance of the system. This can be described by $\dot{Q} = \frac{1}{R_{c,tot}} (T_1 - T_{n+1})$



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