

WEEK 1 SUBMISSION

QUESTION

A short summary about the conductive heat transfer and solving the same exercise with $L = 0.4$ m, $A = 20$ m², $\Delta T = 25$, and $k = 0.78$ W/m K using both simple method and using the resistance concept.

ANSWER

Summary –

Conduction is the diffusion of internal heat within a body due to temperature difference across it. In the case of buildings where there is a difference in temperature between outside and inside, a mono directional transfer of heat occurs through a physical material such as a wall from the outside to inside or vice versa. This heat transfer is known as Conductive heat transfer.

Q_{in} (Rate of heat transfer into the wall) – Q_{out} (rate of heat transfer out of the wall) = dE / dT
(Rate of change of energy in the wall).

Since the heat transfer through the wall is modelled to be steady, $dE / dT = 0$.

Problem

$$Q = kA (T_1 - T_2) / L = (0.78 \times 20 \times 25) / 0.4 = 975 \text{ W}$$

With respect to Resistance

$$R = L / kA = 0.4 / (0.78 \times 20) = 0.02564^\circ \text{ C / W}$$

$$Q = (T_1 - T_2) / R = 25 / 0.02564 = 975.04 \text{ W}$$