

Week1-HULINXUE

1.summary of conductive heat transfer

Heat transfer through the wall of a house can be modeled as steady and one-dimensional. In steady operation, the rate of heat transfer through the wall is constant.

Heat transfer through a wall is proportional to its Area. It is proportional to the difference of temperature and the conductivity. Conductivity: willingness of material to transfer heat. The unit of conductivity is (W/mK)

It is inversely proportional to the thickness. The thicker the wall, the less heat goes through it.

2.solving the same exercise with $L= 0.4 \text{ m}$, $A= 20 \text{ m}^2$, $\Delta T= 25$, and $k=0.78 \text{ W/m K}$ using both simple method and using the resistance concept

Simple method :
$$\dot{Q} = kA \frac{\Delta T}{L} = 0.78 * 20 * \frac{25}{0.4} = 975 \text{ W}$$

Resistance concept :
$$R_{wall} = \frac{L}{kA} = \frac{0.4}{0.78 * 20} \approx 0.0256 \text{ } ^\circ\text{C/W}$$

$$\dot{Q} = \frac{\Delta T}{R_{wall}} = \frac{25}{0.0256} \approx 976.6 \text{ W}$$