

1. Conductive heat transfer summary:

heat conductivity is the thermal conductivity of a substance, passing from high temperature to low temperature within the same substance.

k: the thermal resistance of the flat wall heat conduction, Q: the heat transfer rate, L: length, A: area, T: temperature difference

2. Exercise:

L= 0.4 m, A= 20 m², DeltaT= 25, and k=0.78 W/m

1) simple method:

$$\begin{aligned} Q &= kA \frac{\Delta T}{L} \\ &= 0.78 \text{ W/m} * 20 \text{ m}^2 * \frac{25}{0.4 \text{ m}} \\ &= 975 \text{ W} \end{aligned}$$

2) the resistance concept:

$$\begin{aligned} R_{wall} &= \frac{L}{kA} \\ &= \frac{0.4 \text{ m}}{0.78 \text{ W/m} * 20 \text{ m}^2} \\ &\approx 0.0256 \text{ }^\circ\text{C/W} \end{aligned}$$

$$\begin{aligned} Q &= \frac{\Delta T}{R_{wall}} \\ &= \frac{25^\circ\text{C}}{0.0256 \text{ }^\circ\text{C/W}} \\ &= 976.5625 \text{ W} \end{aligned}$$