

A short summary about the conductive heat transfer and 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

Summary:

Conductive heat transfer is an exchange of energy by direct interaction between molecules of a substance containing temperature differences, it occurs in gases, liquids, or solids and has a strong basis in the molecular kinetic theory of physics.

Solution:

Simple method:

$$\dot{Q} = kA \frac{\Delta T}{L} = 0.78 \times 20 \times \frac{25}{0.4} = 975\text{W}$$

Resistance concept:

$$R_{\text{wall}} = \frac{L}{kA} = \frac{0.4}{0.78 \times 20} = 0.0256^\circ\text{C/W}$$

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