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

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1. Short summary about the conductive heat transfer.

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

Heat transfer through the wall of a house can be modeled as steady and one-dimensional

The rate of heat conduction through a plane wall

- Is proportional to the average thermal conductivity (willingness of material to transfer heat), the wall area and the temperature difference.
- But is inversely proportional to the wall thickness (the thicker the wall, the less heat goes through it).
- Once the rate of heat conduction is available, the temperature $T(x)$ at any location x can be determined by replacing t by T and L by x.

2. **Solving the same class exercise where L=0.4m, A=20m2, $\boldsymbol{\Delta T} = 25$, and K=0.78w/mK using both simple and resistance methods.**

Simple method:

$$\dot{Q} = kA\frac{\Delta T}{L} \quad \frac{25}{0.4} \quad = \quad \mathbf{975\ W}$$

Resistance concept:

$$R_{wall} = \frac{L}{kA} \quad = \quad \frac{0.4}{0.78 * 20} = 0.0256\,°\frac{C}{W}$$

$$\dot{Q} = \frac{\Delta T}{R_{Wall}} \quad = \frac{25}{0.0256°\frac{C}{W}} \quad = \mathbf{976.6\ W}$$