WEEK_1 Againi

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

CONDUCTIVE HEAT TRANSFER

Conductive is associated to the transfer of heat through a solid material.
It is directly proportional to:
-the **average conductivity**
- the **surface** of the solid (measured in m²)
- the **variation of the temperature** (between both sides of the volume.)
It is inversely proportional to
-the **thickness** of the volume. (the ticker the wall is, the less heat can come)

Fourier's law of heat conduction

$$\boldsymbol{Q} = \mathbf{kA\ x}\,\frac{\boldsymbol{\Delta T}}{\boldsymbol{L}}$$

EXERCISE

METHOD 1 (simple method)

$$\boldsymbol{Q} = \mathbf{kA\ x}\,\frac{\boldsymbol{\Delta T}}{\boldsymbol{L}}$$

$$Q = 0.78\,\frac{W}{mK}\,x\ 20\ \text{m}^2\ x\frac{25K}{0.4m}$$

$$\boldsymbol{Q} = \mathbf{975W}$$

METHOD 2 (Resistance concept)

$$Rwall = \frac{\boldsymbol{L}}{\boldsymbol{kA}}$$

$$Rwall = \frac{0.4m}{0.78\frac{W}{mK}\,20\text{m}^2}$$

$$Rwall = 0.0256\,\frac{K}{W}$$

$$Q = \frac{\boldsymbol{\Delta T}}{\boldsymbol{Rwall}}$$

$$Q = \frac{25K}{0.0256\,\frac{K}{W}}$$

$$\boldsymbol{Q} = \mathbf{976.56W}$$