Week1 Assignment

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A short summary about the conductive heat transfer:

Conductive heat transfer is the transfer of heat internal energy from the more energetic particles of a substance to the adjacent less energetic ones as a result of interaction between the particles. Conduction can take place in solids, liquids, or gases. The rate of heat conduction through a medium depends on the geometry of the medium, its thickness, and the material of the medium, as well as the temperature difference across the medium.

(Ref:36 Y. A. Cengel, Heat Transfer, Conduction)

Question:

L=0.4m, A=20m^2, △T=25K, and k=0.78W/m K, using both simple method and using the resistance concept to find the rate of heat transfer through the wall.

Solution:

(1) Using simple method:

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

(2) Using the resistance concept:

$$R_{wall} = \frac{L}{k \cdot A} = \frac{0.4}{0.78*20} = 0.0256\ K/W$$

$$\dot{Q} = \frac{\Delta T}{Rwall} = \frac{25}{0.0256} \approx 976.6W$$