Week1 Assignment

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A short summary about the conductive heat transfer:

The conductive heat transfer is the heat transfer from the part with high temperature to the part with low temperature. It can be expressed by the formula $\dot{Q}$ = kA· $\frac{\triangle T}{L}$, ($\dot{Q}$-heat transfer rate, k - thermal conductivity, A-area, △T-temperature difference, L-length). The heat transfer rate is proportional to the thermal conductivity, the heat conduction area and the temperature difference, and inversely proportional to the heat transfer length.

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· $\frac{\triangle T}{L}$ = 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

$\dot{Q}$ = $\frac{\triangle T}{R_{wall}}$ = $\frac{25}{0.0256}$ ≈ 976.6W