Technical Environmental Solutions
Submission /week 1
Leyana Altemawy

Summery:

Heat transfer is the movement of heat from one object to another, caused by the difference of temperature.
One of the mono dimensional heat transfer methods, is the conductivity. It occurs when the two surfaces are directly connected.
As an example of the conductivity heat transfer, is the heat transfer through a wall. It can be represented by the Fourier's law of heat conduction:

$$\dot{Q} = -kA\frac{dT}{dx}$$

Where:
k: is the conductivity
A: is the wall area
dT/dx: is how much temperature will change through space.

If the wall is containing more than one layer that are different materials, we can use the following equation:

$$\dot{Q} = kA\frac{T1 - T2}{L}$$

That means, the heat transfer through a wall is proportional to its area, proportional to the difference of temperature, and it is inversely proportional to the thickness.

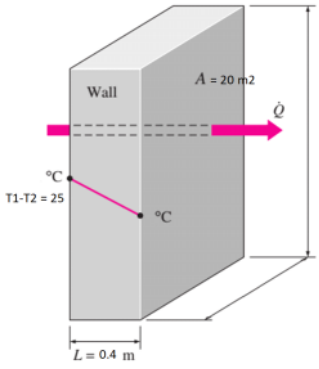
In order to calculate the wall thermal resistance, we can use the following equation:

$$R\ wall = \frac{L}{kA}$$

$$\dot{Q} = \frac{T1 - T2}{kA}$$

Exercise:

Find the rate of heat transfer through the wall if k=0.78 W/m



Solution:

1- Using the Simple method:

$$\dot{Q} = kA\frac{T1 - T2}{L}$$

$$\dot{Q} = 0.78\ x\ 20\ x\ \frac{25}{0.4} = 975\ W$$

2- Using the resistance concept:

$$R\ wall = \frac{L}{kA}$$

$$R\ wall = \frac{0.4}{0.78\ X\ 20} = 0.02564\ C/W$$

Then:

$$\dot{Q} = \frac{T1 - T2}{kA}$$

$$\dot{Q} = \frac{25}{0.02564} = 975\ W$$