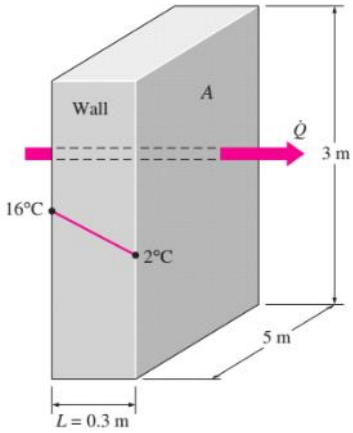
Submission 1

martedì 8 ottobre 2019
12:53

Exercise: L= 0.4 m, A= 20 m2, DeltaT= 25, and k=0.78 W/m K using both simple method and using the resistance concept



Method 1

$$Q = kA\frac{\Delta T}{L} = 0.78\ * 20 * \frac{25}{0{,}4} = 975\ W$$

Method 2

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

$$Q = \frac{\Delta T}{R_{Wall}} = \frac{25}{0.0256} = 976{,}56\ W$$

Conductive heat transfer is the transfer of heat internal energy through invisible collisions of partecels and movements of electrons. In the previous case we analysed the passage of heat in a wall.
Heat transfer throught the wall can be assumed as steady and one dimensional. The temperature of the wall depends on only one direction.
The rate of heat conduction through a plane wall:
is proportional to the average thermal conductivity, the wall area, and the temperature difference
but is inversely proportional to the wall thickness.
Once the rate of heat conduction is available, the temperature T(x) at any location x can be determined by replacing T2 by T, and L by x.

$$Q = kA\frac{\Delta T}{L}$$