# Week 4 - Azra Ozyurt

15 Aralık 2019 Pazar 13:38

TASK 1

Complete the modified example of simplified wall calculations that you went through in the assignment of week 3 and find the total heat transfer through wall.

Week 3 results:

$$R'_{withWood} = 0.03 + 0.14 + 0.11 + 0.63 + 0.079 + 0.12$$
$$= 1.109\ m^2.\circ\frac{C}{W}$$

$$R'_{withIns} = 0.03 + 0.14 + 0.11 + 3.528 + 0.079 + 0.12$$
$$= 4.007\ m^2.\circ\frac{C}{W}$$

$$R'_{total} = 5.116\ m^2.\circ\frac{C}{W}$$

$$U_{tot} = \frac{1'}{R} = U$$

$$U_{tot} = 0.9 + 0.249 = 1.149$$

$$Q_{tot} = U_{tot} \times A_{tot} \times \Delta T = 1.149 * 100 * 24 = 1065.3\ W$$

## TASK 2

**RADIATION**

Radiation can happen in vacuumed area, which explains that it doen not need material space in order to occur, because of the neture of wavelenghts. It can happen with solids, liquids and gasses.

When something changes in a material in molecular level, the difference of energy will create waves. These waves are electromagnetic waves and characterised by wavelenghts and frequency.

$$\lambda = \frac{c}{\nu}$$

Type of electromagnetioc radiation that is related to the heat transfer is thermal radiation.

Thermal radiation is always emmited by surroundings and he emmisivity will increase with the increasing temprature.

**Radiative Heat Transfer**

One of the ways for the heat to transfer from one body to another is radiative heat transfer. It will occur with waves carrying the energy. So the heat transfer will be defined and occur with wavelengths and frequencies. All matters which have the temperature above the absolute zero always emits thermal radiation. The energy that is emitting from one body will be absorbed by another. The waves does not require material in between space to carry the heat, so radiation can occur in vacuumed areas. Though it will take place in all forms of material such as solids, liquids and gasses.

**BLACK BODY**

A blackbody is the ultimate condition theory of radiation. A black body surface will emit and absorb the maximum radiation amount possible. It is the perfect emmiter and the perfect absorber surface.

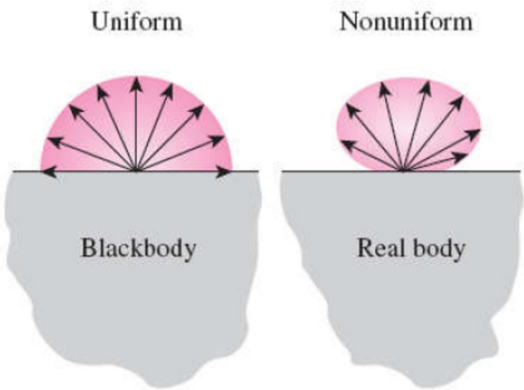
The radiation energy emitted by a blackbody:

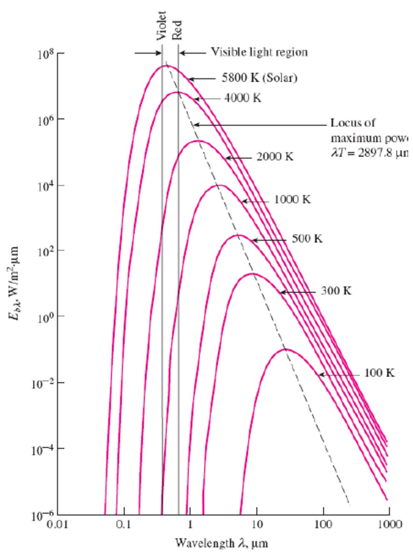
$$E_b(T) = \sigma T^4 \qquad (\mathrm{W/m^2})$$

*Blackbody emissive power*

$$\sigma = 5.670 \times 10^{-8}\ \mathrm{W/m^2 \cdot K^4}$$

*Stefan–Boltzmann constant*




The variation of the blackbody emissive power with wavelength for several temperatures.

As mentioned before, the emisivity and absorbance of radiation depens on temprature.