Assignment 4. FTorresPérez

miércoles, 23 de octubre de 2019 09:31 p. m.

1) **Previous results:**

	Urethane Rigid Foam	**Plywood**
Outside Air	**0,03**	**0,03**
Wood bevel l.	**0,14**	**0,14**
fiberboard(13mm)	**0,23**	**0,23**
Urethane R.F.	(0,98*90/25) **3,528**	**No**
Plywood	**No**	(0,11*90/25) **0,7615**
Gypsum board	**0,079**	**0,079**
Inside surface	**0,12**	**0,12**

$$\boldsymbol{R'_{URF}} = 0.03 + 0.14 + 0.23 + 3{,}528 + 0.079 + 0.12 = \mathbf{4,127\ m^2.°C/W}$$

$$\boldsymbol{R'_{Plywood}} = 0.03 + 0.14 + 0.23 + 0{,}7605 + 0.079 + 0.12 = \mathbf{1,3605\ m^2.°C/W}$$

$$\boldsymbol{T_{int}} = \mathbf{20°C}$$
$$\boldsymbol{T_{ext}} = \mathbf{-10°C}$$
$$\boldsymbol{\Delta T} = \boldsymbol{T_{int}} - \boldsymbol{T_{ext}}$$
$$\boldsymbol{\Delta T} = \mathbf{20°C} - (\mathbf{10°C})$$
$$\boldsymbol{\Delta T} = \mathbf{30°C}$$

$$\boldsymbol{U_{RFM}} = \frac{1}{\boldsymbol{R'_{RFM}}} = \frac{1}{\mathbf{4,127\ m^2.°C/W}} = \mathbf{0,2423\ W/m^2°C}$$

$$\boldsymbol{U_{Plywood}} = \frac{1}{\boldsymbol{R'_{Plywood}}} = \frac{1}{\mathbf{1,3605\ m^2.°C/W}} = \mathbf{0,7350\ W/m^2°C}$$

$$\boldsymbol{U_{total}} = \boldsymbol{A_{URF}\ x\ U_{RFM}} + \boldsymbol{A_{Plywood}\ x\ U_{Plywood}}$$

$$\boldsymbol{U_{total}} = \mathbf{0,75\ x\ 0,2450\ W/m^2°C} + \mathbf{0,25\ x\ 0,7350\ W/m^2°C}$$

$$\boldsymbol{U_{total}} = \mathbf{0,1837\ W/m^2°C} + \mathbf{0,1837\ W/m^2°C}$$

$$\boldsymbol{U_{total}} = \mathbf{0,3675\ W/m^2°C}$$

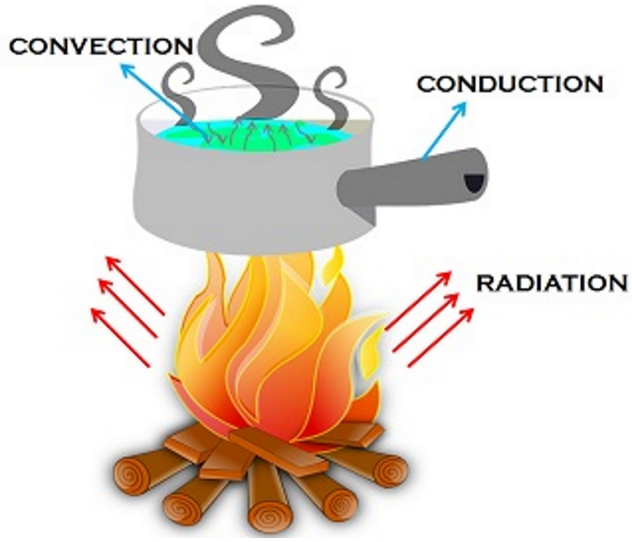
$$As = 2,5\ x\ 50\ x\ 0,80$$
$$As = 125\ x\ 0,80$$
$$As = 100\ m^2$$

$$\dot{Q} = U_{total}\ x\ As\ x\ \Delta T$$

$$\dot{Q} = 0,3675\ W/m^2°C\ x\ 100\ m^2\ x\ 30°C$$
$$\dot{Q} = 1102,5\ Watts$$

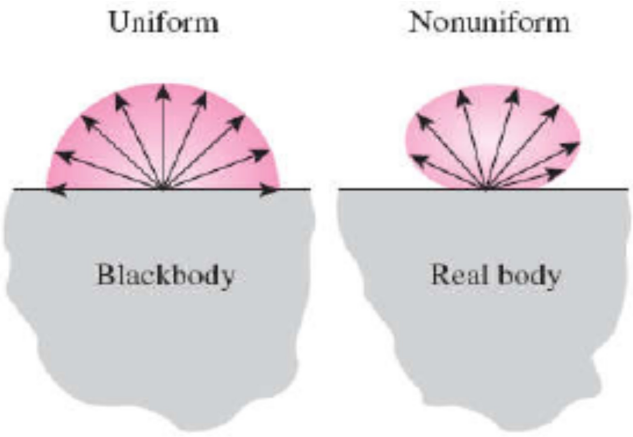
2) Radiation and Radiative Heat transfer:

Radiation refers to the transfer of temperature through a fluid, the main difference between radiative heat transfer, convective heat transfer and conductive heat transfer is that for radiative heat transfer the direct contact of the subjects is not mandatory, thus it is made by the propagation of discrete pockets of energy called Photons or Quanta. A very good example of the difference between radiative heat transfer, convective heat transfer and coductive heat transfer is the next one:



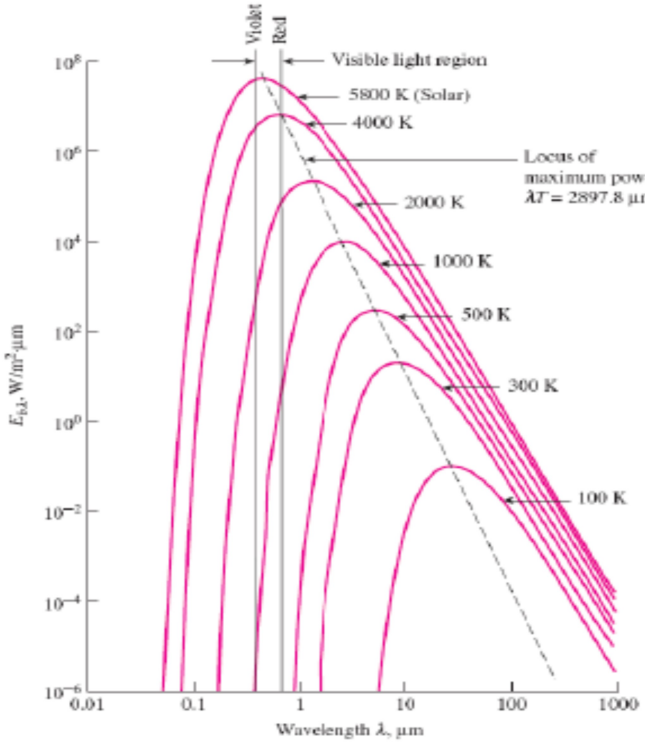
As we can see in the example, radiatiave heat transfer refers to the heat transfer by the fire, which propagates energy. Convective heat transfer refers to the heat transfer between the hot water and the air because of the different density of the air next to the water, and the envirnoment one. Conductive heat transfer refers to the transfer between the hot pan and the subject holding it, by direct contact and the difference of temperature of each one of them. We can conclude fron this example that **Radiation doesn't requier the presence of a material medium to take space, and radiation transfer occurs in solids as well as liquids and gases**

Radiative heat transfer occurs because of accelerated charges that create magnetic fields. These are called electromagnetic waves and caracterized by their frequency and their wavelenght.
All bodies, or matter emit thermal radiation, thus when we calculate the radiative heat transfer inside a room or a building, we must consider all of the elements that compose it, as well as all the furniture and possible users. This is the main reason why specialized software is used to do such calculations.
There is another level of complications because different bodies emit different amounts of radiation, depending on its position, size, etc. This is where the conecpt of a **black body** comes from. We can consifer it as a perfect emitter and absorver of radiation, which absorbs all incident radiation, regardeless of the wavelenght and direction.



Our main source of radiative heat transfer and light is the sun, even though the electromagnetic radiation that it emits is known as solar radiation. Nvertheless, light is part of radiation, which forms part of the visible range of the electromagnetic spectrum.

The visible range of the electromagnetic spectrum is a very short segment of wavelenght, that is the reason why we can see the sunlight, or light emitted by lightbulbs or lamps. Nevertheless, we can not see infrared or ultraviolet light, because they are outside this spectrum. It is not possible to see the radiation of any object whose tempreature is under 800 degrees kelvin, because they are in the infrared region.



This chart ilustrates the visible light region of different black bodies at different tempertaures. **We can conclude from it that the emissive power of an objects depends n it´s temperature, it´s wavelenght, and it´s emissive power.**

In conclusion, radiative heat transfer reffers to the kind of heat transfer that doesn't require the presence of a mateiral medium to take place, and it can happen between solids, gases and liquids.

Radiation reffers to the emission of energy from different bodies, which depends on it´s wavelenght and radiative power. The human eye can only see some radiation at a very specific wavelenght and temperature, which is called the visible range.