Assignment Week 4.
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1)

	WOOD	INSULATION
Outside air	0,03	0,03
Wood bevel	0,14	0,14
Plywood	0,11	0,11
Urethane rigid foam	NO	0,98*90mm/25mm= 3,52
Wood studs	0,63	NO
Gypsum board	0,079	0,079
Inside surface	0,12	0,12
	Rwood= 1,109 m2°C/W	**Rins= 3,99 m2°C/W**

U_{wood}= 1/R_{wood} = 1/1,109 m2°C/W = 0, 90 W/ m2°C

U_{ins} = 1/R_{ins} = 1/ 4 m2°C/W = 0,25 W/ m2°C

Utotal = 0,25 x U_{wood} + 0,75 x U_{ins}

Utotal = (0,25 x 0,90 W/ m2°C) + (0,75 x 0,25 W/ m2°C)

Utotal = 0,225 W/ m2°C + 0,19 W/ m2°C

Utotal = 0,42 W/ m2°C

Qtotal= Utotal x A total x ΔT

Qtotal= 0,42 W/ m2°C x 50m . 2,50m x 20°C – (-10°C)

Qtotal= 1,575 W

2) Radiation Heat transfer

Radiation is the act of transmitting or emitting energy in liquids, solid or gases. That is to say that every object creates radiation. Unlike conduction or convection, the radiation does not require the presence of a material medium to take place; instead it can be done also in the space.

The way of transporting energy is through electromagnetic waves (or electromagnetic radiation) as the result of changes in the electronic configuration of atoms and molecules. These electromagnetic waves are characterized for their frequency or their wavelength. Its mathematical expression is:

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

When we talk about heat transfer, the electromagnetic radiation that matter is the thermal radiation. This thermal radiation is constantly emitted by every object whose temperature is above zero. Moreover, the thermal radiation emission increase when the temperature of an object increase.

Black body radiation.

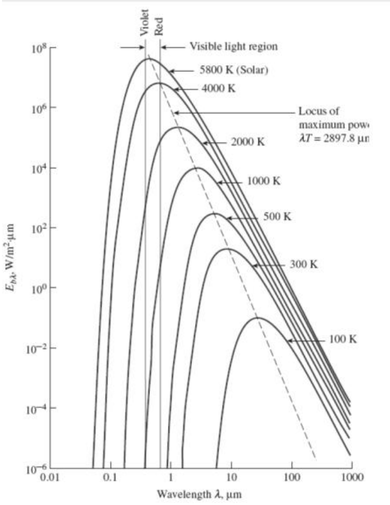
A black body is an ideal body that absorb and emits radiation perfectly. That is to say the maximum radiation possible for a determinate temperature. It is not a real body, if not an idealized one, useful to compare the radioactive properties of real surfaces. In the case of a blackbody the radiation is consider to be uniform and in a real body non uniform.

The emissive power of a blackbody is:

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

Using this formula, if we integrate the area under every curve, we will get the total amount of radiation for a determinate temperature.

Plank's law.



According to Plank's law, the radiation (the emission power) depends on the temperature.

Conclusions:

-For a determinate temperature (for example 100k), we only have radiation in a determinate range of wavelength.

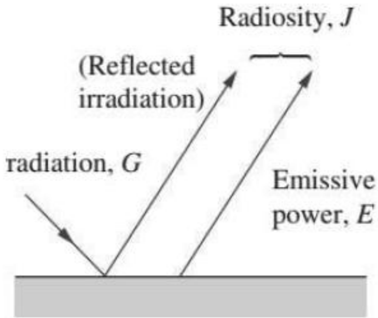
- The visible range for all temperatures takes place on the same wavelength rage.

- Humans are not able to see radiation levels under 100 wavelengths.

When we talk about heat transfer, the radiation that goes from one object to another is almost zero.

As described before, all surfaces emit radiation, but at the same time they reflect it, that is to say that the radiation leaving a surface is compound by the emitted and reflected components.

If we would like to express the amount of energy that leaves a unit area of a surface in all directions, we must talk about radiosity. Radiosity is the emission power plus the reflection from other objects.



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