TA**S**K **1 _** In you own words (which means in your own words) write a summary of the topics about radiative heat transfer we went through including the definitions of emissivity, absorptivity and reflectivity, the view factor, the heat exchange betweeen two black surfaces,the heat exchange between the two gray surface and finally the definition of radiative resistances

RADIATIVE HEAT TRANSFER

Radiation is one of the three ways in which heat propagation occurs. In particular, unlike conduction and convection, radiation does not provide for direct contact between the exchangers, and does not require a means to propagate.
So it is a phenomenon that affects every material aggregate, no matter whether solid, liquid or gaseous, and also occurs in a vacuum.
There is both emission and absorption of electromagnetic radiation.
Physically the radiation consists in the emission of electromagnetic waves generated by atoms and molecules excited by thermal agitation, which are de-energized by emitting photons of a frequency proportional to their temperature.
The heat exchanged by radiation is transmitted mainly from the body at a higher temperature to that at a lower temperature; in reality, energy propagates in both directions, but with less intensity from cold to warm. In fact, if a body emanates only and never absorbed electromagnetic energy, its temperature would reach absolute zero.
Furthermore, a body with a temperature equal to absolute zero could not transmit heat by radiation.
The emission and absorption depend on the frequency of the radiation, the nature of the body and some characteristics of its surface; a body having a dark surface is a good absorber and a good heat emitter by radiation.

DEFINITIONS OF EMISSIVITY, ABSORPTIVITY AND REFLECTIVITY

The radiant energy incident on a surface is measured by the quantity known as radiation; it breaks down into three terms: a part is reflected, a part is absorbed and a third party manages, if necessary, to pass through the surface or transmitted. For this reason, three coefficients are established:
The reflectance measures, in optical, the ability to reflect part of the light incident on a given surface or material.
Absorbance is the amount of light that is absorbed by a body
Transmittance (generally indicated with τ), in optics and spectroscopy, represents the ability of a material to let itself be crossed by a part of the incident light.

VIEW FACTORY

The view factoryis the fraction of the radiation emissed by a surface and intercepted by a second surface. It is a geometrical quantity, so it depends only on the shape of the surface (or object).

HEAT EXCHANGE BETWEEN TWO BLACK SURFACES

We consider two black body objects 1 and 2 with their areas A1 and A2.The energy emissed by the first object is E1A1 and for the second object E2A2. Hence, the energy leaving the first object to the second object will be E1A1F12 and the energy leaving the

second object to the second will be E2A2F21. The energy exchange between object 1 and object 2 is E1A1F12 - E2A2F21 = Q^{dot}

HEAT EXCHANGE BETWEEN THE TWO GRAY SURFACE

Grey bodies absorb part of radiation on the surface as well as reflect a portion of radiation off of the surface. In the heat exchange between two surfaces the reflected radiation of one object will be absorbed by the other object for a certain fraction and reflect the other radiation.

RADIATIVE RESISTANCES

The radiative resistance is the resistance of a specific material of heat flow through its boundaries. This value depends on the geometric shape and the thermal properties (thermal conductivity)

Task 2 Solve the last example you solved in the class (radiative heat exchange between two parallel plates) awhile considering the two emissivities to be 0.1, what can you conclude from the result?

$\sigma = 5.67 \times 10^{-8}$ W / m^2K^4
T1 = 800K
T2 = 500K

$Q_{net\ 12} = A\sigma(T_1^4 - T_2^4) / [(1/\varepsilon_1) + (1/\varepsilon_2) - 1] = 3629.15W$
(Where ε_1=0.2 and ε_2=0.7)
ε1=0.1 ε2=0.1
$Q_{net\ 12} = A\sigma(T_1^4 - T_2^4) / [(1/\varepsilon_1) + (1/\varepsilon_2) - 1] = 1 \times 5.67x10\text{-}8\ (8004 - 5004) / 1/0.1 + 1/0.1 -1 = 1035.81W$
When we have a change of the emissivity then Q_{net} changes drastically.