Salman Sadeghi (10649160)
Weekly Submission 5

Task1 --> Summary of topics :

Radiative heat transfer :

Radiative heat transfer has a totally different form of transmission from heat conduction and heat transfer. In heat conduction and heat transfer, energy is transported by the diffusion caused by the motion, oscillation and rotation of molecules, atoms, electrons of the medium. On the other hand, in radiative heat transfer, the energy is transported by the electromagnetic waves emitted from the object.

Definitions of emissivity :

Emissivity is :

1.the relative power of a surface to emit heat by radiation

2.the ratio of the radiant energy emitted by a surface to that emitted by a black body at the same temperature.

Emissivity essentially compares the thermal radiation of a material to that of a perfect emitter, a 'black body.' This black body has an emissivity of 1.0 and is used as the reference point for the perfect emitter. That is, the 'black body' emits the full spectrum of infrared radiant energy when measured.
Or
Emissivity is the ratio of radiation emitted by a surface and radiation emitted by a black body at the same temperature. Emis sivity depends on wavelength of radiation, surface temperature and surface roughness.

Absorptivity:

The fraction of irradiation absorbed by the surface is called the absorptivity (α). It is the ratio of absorbed radiation (G abs) to incident radiation (G).

Its value: $0 \leq \alpha \leq 1$

Reflectivity :

The fraction of radiation reflected by the surface is called the reflectivity (ρ). It is the ratio of reflected radiation (G ref) to incident radiation (G).

Its value: $0 \leq \rho \leq 1$

Transmissivity :

The fraction of radiation transmitted is called the transmissivity (τ). It is the ratio of transmitted radiation (G tr) to incident radiation (G).

Its value: $0 \leq \tau \leq 1$

The view factor :

The view factor F12 is the fraction of energy exiting an isothermal, opaque, and diffuse surface 1 (by emission or reflection), that directly impinges on surface 2 (to be absorbed, reflected, or transmitted)/

The heat exchange between two black surfaces :

A body that emits the maximum amount of heat for its absolute temperature is called a black body. Two black bodies that radia te toward each other have a net heat flux between them. The net flow rate of heat between them is given by an adaption of equation.

The heat exchange between two grey surfaces :

Black body is an object that absorbs all the radiant energy reaching its surface from all the direction while gray body is a body whose absorptivity.
The net radiant exchange between two isothermal gray surfaces whose areas are A1; A2 respectively and whose emissitives are $\epsilon 1$; $\epsilon 2$ respectively is given by :
Q_ 12 = Eb1- Eb2 / Rt

The definition of radiative resistances :

Is a value to measure the energy depleted by loss resistance which is converted to heat radiation , the energy lost by radiat ion resistance is converted to radio waves .

Task2 .

A1 = 1.5 m^2
F_12 = 0.01
T__1 = 800 K
T_2 = 500 K

$\epsilon_{1=}$ 0.1
$\epsilon_{2=}$ 0.1

$\sigma = 5.67 * 10^8 \frac{W}{m^2 K^4}$

Now calculating between two parallel :

$$\dot{Q_{net}} 2 \rightarrow 1 = \frac{A_\sigma (T_1^4 - T_2^4)}{\frac{1}{\epsilon_2} + \frac{1}{\epsilon_1} - 1} = \frac{1.5\left(5.67 * 10^{-8}\right) * (800^4 - 500^4)}{\frac{1}{0.1} + \frac{1}{0.1} - 1} = 1035.82\ W$$

In Conclusion :

It shows that the greatest impact on the net heat exchange between the two surfaces will be produced by the emissivity value . On the other hand , in the case we have less emissivity in both surfaces , the heat exchange is lower per square meter.