**Week 5_GAN HUI 10712558**

**Task 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.

**Answer:**

**Emissivity:** emissivity tell us how efficiently material infrared energy. Property that relates how well a material radiates infrared energy compared to an ideal material (such as black body) at the same temperature. (values from 0.0 to 1.0).
Material with High emissivities are easy to see and measure , you can trust what you you see. Low emisssiveties, you cannot trust what you see. Many camera material have high emissivities.

**Absorptivity:** Absorptivity is a measure of how much of the radiation is absorbed by the body. The object that can absorb all the rays is a black body, and its absorption rate is 1. The absorption rate of the actual object is less than 1, depending on the material, and is related to the wavelength range and angle of incidence of the received heat rays.

**Reflectivity:** Reflectivity is a measure of how much is reflected. Different objects have different reflectivity. Reflectivity mainly depends on the nature of the objects, as well as the wavelength of incident electromagnetic wave and incident angle. The range of reflectivity is always less than or equal to 1. The relationship between reflected, absorbed and transimitted is $\alpha\lambda + \rho\lambda + \tau\lambda = 1$.

**View factor**: view factor is a geometrical quantity corresponding to the fraction of the radiation leaving surface which intercepted by the surface. F12 is the part of radiation emitted by the surface 1 and received by the surface 2.it's not depend on the properties of the surface.

**Heat Exchange ( between two Black Surfaces):** The two black surfaces will constantly absorb and emission all the radiation. A black surface will emit a radiation of Eb1 per unit area per unit time .If The surface is having A1 unit area then it will emit Eb1*A1 Radiation in unit time.This radiation will go to the other black surface and totally absorb by it but at the same time The 2nd black body will emit its radiation Eb2*A2 per second and it will go to 1st body and totally absorbed by it.

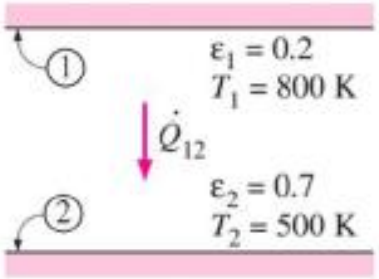
**Heat Exchange (between the two Gray Surface):**

Unlike black surface, the heat exchange between two gray surfaces absorbs and reflects only partly portion of the radiation.A gray surface emits radiation to another gray surface, Tradiation leaving the entire surface i that strikes surface j subtracts radiation leaving the entire surface j that strikes surface i. Can be expressed by a formula: $A_iJ_iF_{i-j}$-$A_jJ_jF_{j-i}$, (A represents the area of the black surface,the J represents the amount of radiation emitted per unit area per unit time, F represents the view factor), and applying the reciprocity relation: $A_1F_{1-2}$= $A_2F_{2-1}$, so $\dot{Q}_{i\to j} = A_i \times F_{i-j} \times (J_i - J_j)$.

**Radiative resistance:**

The radiative resistance is a value used to measure the loss resistance energy, and the loss energy is converted into heat radiation.

**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?



$\varepsilon_1 = 0.2, \varepsilon_2 = 0.7$

$\dot{Q}_{1\to 2} = \frac{A_1\sigma\left(T_1^4 - T_2^4\right)}{\frac{1}{\epsilon_1}+\frac{1}{\epsilon_2}-1}$ = AX5.67X10-8X(8004-5004)/1/0.2+1/0.7-1=3625.37AW

$\varepsilon_1 = 0.1, \varepsilon_2 = 0.1$

$\dot{Q}_{1\to 2} = \frac{A_1\sigma\left(T_1^4 - T_2^4\right)}{\frac{1}{\epsilon_1}+\frac{1}{\epsilon_2}-1}$ = AX5.67X10-8X(8004-5004)/1/0.1+1/0.1-1=1035.82AW

Conclusion: when the value of emissivity increases, the value of radiative heat transfer will increase.