WEEK5_hulinxue

Task 1 **In you 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**

Emissivity: The ability to measure the relative strength of an object's surface in the form of heat radiation.
The ratio of the radiation emitted by the surface at a given temperature to the radiation emitted by a blackbody at the same temperature. The emissivity of blackbody is 1 ,and the emissivity of other objects is between 0 and 1.

In general, The darker the material with the rougher the surface, and the closer the emissivity is to 1. The higher the reflectivity of the material, the lower its emissivity.The emissivity of a real surface varies with the temperature of the surface as well as the wavelength and the direction of the emitted radiation.

Absorptivity: Absorptivity is the ratio of the radiation absorbed by an object divided by total radiation on surface.the absorptivity of object's surface is related to the inherent characteristic of the object , such as the nature,surface and temperature of this object.external environment can not affect the absorptivity of object.absorptivity of object is between 0 and 1.

Reflectivity: reflected radiation by an object divided by total radiation on the surface.the reflectivity of object is also between 0 and 1.

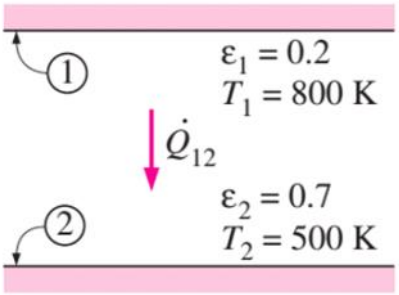
View factor: is a geometrical quantity corresponding to the fraction of the radiation leaving surface i that is intercepted by the surface j.F12 is the part of radiation emitted by the surface 1 and received by the surface 2.it's not depend on the properties of the surface.

the heat exchange betweeen two black surfaces:
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 .The whole process happened simultaneously .So the net heat heat transfer between these surfaces will be the net heat per second (power) gained by any of the two sufaces (obviously same for both surfaces).

the heat exchange betweeen two grey surfaces:
grey bodies absorb a certain amount of radiation while reflecting a portion of the radiation off of the surface back into space. A gray surface i emits radiation to another gray surface j, radiation 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: AiJiFi-j- AjJjFj-i, (A represents the area of the black surface, J represents the amount of radiation emitted per unit area per unit time, F represents the view factor).

radiative resistances:
The radiative resistance is a value used to measure the loss resistance energy, and the loss energy is converted into heat radiation; the energy lost by the radiative resistance is converted into radio waves.

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?**



1.When $\epsilon_1 = 0.2, \epsilon_2 = 0.7$

$\dot{Q}_{1\to2} = \frac{A_1\sigma\left(T_1^4 - T_2^4\right)}{\frac{1}{\epsilon_1}+\frac{1}{\epsilon_2}-1} = \frac{\mathrm{A}*\mathbf{5.67}*10^{-8}*\left(800^4-500^4\right)}{\frac{1}{0.2}+\frac{1}{0.7}-1} =$ 3625.37A W

2.When $\epsilon_1 = 0.1, \epsilon_2 = 0.1$

$\dot{Q}_{1\to2} = \frac{A_1\sigma\left(T_1^4 - T_2^4\right)}{\frac{1}{\epsilon_1}+\frac{1}{\epsilon_2}-1} = \frac{\mathrm{A}*\mathbf{5.67}*10^{-8}*\left(800^4-500^4\right)}{\frac{1}{0.1}+\frac{1}{0.1}-1} = 1035.82AW$

Conclusion: if Emissivity of object decrease ,the radiation will also decrease