**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.**

**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?**

**Answer:**

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## Summary:

Radiative heat transfer:
Each object in nature is constantly emitting radiant heat into space, and at the same time, it is constantly absorbing the radiant heat emitted by other objects. The heat transfer between the surface of the object is completed by the combined action of radiation and absorption, which is radiative heat transfer.

Emissivity:
The ratio of the radiation flux emitted per unit area on the surface of an object to the radiation flux emitted by the black body at the same temperature. The ratio of the radiation emission of an object to that of an absolute black body at the same temperature and wavelength. It shows that the actual thermal radiation of the object is close to that of the black body. It is one of the important basic factors that affect the surface temperature.

Reflectivity:
The amount of radiant energy reflected by an object as a percentage of the total radiant energy is called reflectivity. The reflectivity of different objects is also different, which mainly depends on the nature of the object itself (surface condition), as well as the wavelength of incident electromagnetic wave and incident Angle. The range of reflectivity is always less than or equal to 1, and the reflectivity can be used to judge the nature of the object.

The view factor:
The view factor, is a geometrical quantity corresponding to the fraction of the radiation leaving surface A that is intercepted by the surface B. In radiative heat transfer, a view factor , is the proportion of the radiation which leaves surface A that strikes surface B. In a complex 'scene' there can be any number

of different objects, which can be divided in turn into even more surfaces and surface segment.

Heat exchange between 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 transfer between these surfaces will be the net heat per second (power) gained by any of the two surfaces ( obviously same for both surfaces). The net heat transfer is the radiation leaving the entire surface 1 that strikes surface 2 subtracts the radiation leaving the entire surface 2 that strikes surface 1, which is, in formula: A1Eb1F1-2 - A2Eb2F2-1.

The heat exchange between the two gray surface
A gray surface will reflect/absorb a given fraction of the thermal radiation a blackbody surface would absorb. More importantly, the graybody/blackbody fraction is independent of radiation wavelength. For a given grey body surface i, with the area Ai, emitting a radiation of Ebi per unit area per unit time. The net heat transfer is the radiation leaving the entire surface i subtracts the radiation incident on the entire surface i, which is, in formula: Ai(Ji-Gi). The radiosity Ji can be calculated by the following formula: ε iEbi+(1- ε i)Gi.

Radiative resistance:
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. From one surface to another, the total resistance is:

$$R_1 = \frac{1 - \varepsilon_i}{A_i \varepsilon_i}$$

**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?**

$$\dot{Q}_{Net2-1} = \frac{A\sigma\left(T_2^4 - T_1^4\right)}{\frac{1}{\varepsilon_2} + \frac{1}{\varepsilon_1} - 1} = \frac{1.5 \times (5.67 - 10^{-8}) \times (308^4 - 298^4)}{\frac{1}{0.1} + \frac{1}{0.1} - 1} = 4.982$$

When $F_{1-2} = 0.01$

$$\dot{Q}_{net1-2} = A_1 \times F_{12} \times \sigma\left(T_1^4 - T_2^4\right) = 1.5 \times 0.001 \times 5.67 \times 10^{-8} \times *(308^4 - 298^4) = -0.9466\ W$$

Bwcause $A_1 = A_2$

So $\dot{Q}_{net2-1} = -\dot{Q}_{net1-2} = 0.9466\ W$