#Week 5

Task 1 In your 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 between 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?

Task 1

The emissivity of an object can be measured from a value between 0 and 1. An object's emissivity is the power of its surface to emit heat by radiation. It is a ratio of the radiant energy emitted by a surface to that emitter by a blackbody at the same temperature since a blackbody is an illustration of absolute emission and radiation.

Moreover, absorptivity can be described as the degree to which something is capable of absorbing another substance such as a liquid, or even energy. Such as a sponge absorbing water at a fast rate, or another person absorbing someone else's negative/positive energy.

Reflection on the other hand is a physical property that can alter the path/direction of radiation or emission. Reflection is the measure of the ability of a surface to reflect radiation or light.

The view factor is the fraction of radiation leaving one surface which is intercepted by a second surface. The intensity of the emitted radiation depends on the view factor of the surface relative to the sky.

In the case of heat exchange between two black surfaces the fraction of the radiative energy that is diffused from one surface element and strikes the other surface directly with no intervening reflections, since there is an absolute absorption rate.

Grey bodies absorb a certain amount of radiation while reflecting a portion of the radiation off of the surface back into space. Which makes the calculation of black bodies simpler.

Radiation resistance is the force of which prevents the passage of radiation waves.

Task 2

When the ϵ_1=ϵ_2=0.1;

$$R'_{total} = \frac{1}{0.1} + \frac{1}{0.1} - 1 = 19$$

$$\dot{Q}'_{12} = \frac{A\sigma(T_1^4 - T_2^4)}{\frac{1}{\epsilon'_1} + \frac{1}{\epsilon'_2} - 1} = A * 5.67 * 10^{-8} * \frac{800^4 - 500^4}{\frac{1}{0.1} + \frac{1}{0.1} - 1} = 1035.72W.A$$

When the ϵ_1=0.2 and ϵ_2=0.7;

$$R_{total} = \frac{1}{0.2} + \frac{1}{0.7} - 1 = 5.43$$

$$\dot{Q}_{12} = \frac{A\sigma(T_1^4 - T_2^4)}{\frac{1}{\epsilon_1} + \frac{1}{\epsilon_2} - 1} = A * 5.67 * 10^{-8} * \frac{800^4 - 500^4}{\frac{1}{0.2} + \frac{1}{0.7} - 1} = 3624.68\, W.A$$

When the emissivity of two surfaces is equal, we can conclude that heat transfer is much lower than surfaces with different emissivity.