Week 5 Assignment

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

Emissivity is the amount of energy an object or a surface is able to emit at a certain temperature.
Given by:

$$E_{theRealOne} = \epsilon \times \sigma T^4$$

Absorptivity is the amount of energy an object or a surface is getting and absorbing from another object or surface at a certain temperature.

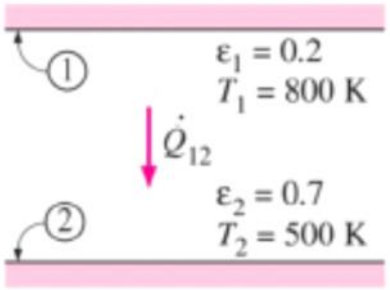
Reflectivity the amount of energy reflected from a surface.

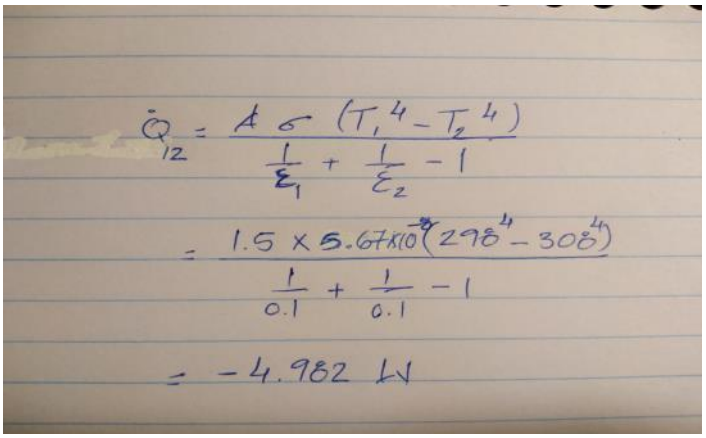
The view factor is a geometrical quantity corresponding to the fraction of the radiation leaving surface i that is intercepted by the surface j.
Heat Exchange (between two Black Surfaces): The two black surfaces will constantly absorb and emission all the radiation. A black surface will emit a radiation 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, T 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,the J represents the amount of radiation emitted per unit area per unit time, F represents the view factor), and applying the reciprocity relation: A1F1-2= A2F2-1, so .

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?





Conclusion: heat transfer is affected by emissivity