radiative heat transfer:

1. emissivity:
Is the ability to measure the relative strength of an object's surface in the form of radiation.
the black body's emissivity = 1
0 < other objects < 1

2. absorbaptivity:
is the ratio of the heat radiation energy absorbed by an object onto the object and the total heat radiation energy projected onto the object.

3. reflectivity:
is the radiant energy reflected by the object as a percentage of total radiant energy. The reflectivity of different objects are also different, depending on the ~~chara~~ feature of object (surface condition) and wavelength and angle of incident electromagnetic wave.

4. view factor:
is a portion of the energy emitted (radiated or reflected) from an isothermal, opaqua, diffusely reflecti surface that is emitted directly to another plane (absorbed or reflected by it).

5. heat exchange between two black surfaces.

A black surface will emit a radiation of E_{b1} per unit area per unit time. If the surface is having A_1/unit area, then it will emit $E_{b1} * A_1$ Radiation in unit time. This radiation will go to the other black surface and totally absorb by it but at the same time. The second black body will emit its radiation $E_{b2} * A_2$ per second and it will go to first body and totally absorbed by it. The whole process happened simulataneously. So the net heat transfer between these surfaces will be 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 substracts the radiation leaving the entire surface 2 that strikes surface 1, which is, in formula: $A_1 B_1 F_{1-2} - A_2 E_b F_{2-1}$

6. Heat exchange between two grey surfaces.

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 A_i, emitting a radiation of E_{bi} per unit area per unit time. The net heat transfer is the radiation leaving the entire surface i substrats the radiation incident on the entire surface i, which is, in formula: $A_i(J_i - G_i)$. The radiosity J_i can be calulated by the following formula: $\varepsilon_i E_{bi} + (1-\varepsilon_i) G_i$.

7. Radiative resistance

Radiative resistance is a value to measure the energy depleted by loss resistance which is converted to heat radiation, the energy lost by radiation resistance is converted to radio waves.

It can be calulated by this formula:

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

Task 1:

Find the net radiative heat exchange between the surface 1 and 2 where $A_1 = 1.5 m^2$, $\varepsilon_1 = 0.1$, $\varepsilon_2 = 0.1$, $T_1 = 298 k$, $T_2 = 308 k$, $\sigma = 5.67 * 10^{-8} \frac{W}{m^2 k^4}$

According to the formula:

$$\dot{Q}_{net2-1} = \frac{A\sigma(T_2^4 - T_1^4)}{\frac{1}{\varepsilon_2} + \frac{1}{\varepsilon_2} - 1}$$

By introducing the values metioned in the question into formula,

$$\dot{Q}_{net2-1} = \frac{1.5 \times 5.67 \times 10^{-8} \times (308^4 - 298^4)}{\frac{1}{0.1} + \frac{1}{0.1} - 1}$$

$$\approx 4.9823 W$$

Meanwhile, under situation, based on the following form

$$F_{1-2} = \frac{1}{\frac{1}{\varepsilon_2} + \frac{1}{\varepsilon_1} - 1} = \frac{1}{\frac{1}{0.1} + \frac{1}{0.1} - 1} \approx 0.0526$$

Autem, when $F_{1-2} = 0.01$,

$$\dot{Q}_{net1-2} = AF_{1-2}\sigma(T_1^4 - T_2^4)$$

$$= 1.5 \times 0.01 \times (5.67 \times 10^{-8}) \times (298^4 - 308^4)$$

$$\approx -0.9466 W$$

$\because A_1 = A_2$ $\quad \frac{A_1\sigma(T_1^4 - T_2^4)}{\frac{1}{\varepsilon_1}+\frac{1}{\varepsilon_2}-1} = \frac{A_2\sigma(T_2^4 - T_1^4)}{\frac{1}{\varepsilon_2}+\frac{1}{\varepsilon_1}-1}$

$\therefore \dot{Q}_{net2-1} = -\dot{Q}_{net1-2} \approx 0.9466W$.

By comparing the two values of net heat exchange under different situation, we can see that the value of emessivity would greatly affect the radiative heat exchange between the surfaces.