Technical environmental system – Weekly submission V

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Task I

The transmission of energy through space is called radiation. This process of heat transmission does not depend on the presence of a material .Unlike conduction and convection, radiation does not need a medium to occur, because the thermal energy in this process is transferred by electromagnetic waves, which are able to propagate in a vacuum. Solar energy, for example, comes that way. Because the planet and the sun are situated in a vacuum, this form of propagation is the only one that allows the earth to receive solar energy.

Emissivity: Emissivity is the ability of an object to emit electromagnetic radiation when compared to the so-called "blackbody" for the same temperature and wavelength. The emitted energy is proportional to the fourth power of the temperature of an object. Emissivity can be a value from 0 (reflected by a mirror) to 1.0 (theoretical blackbody).

Absorptivity: It represents the amount of radiation that is the incident a body is able to absorb. It can also be expressed as a function of wavelength, inclination angle.

reflectivity: Represents the portion of the radiation that is reflected by the body. It depends on the inclination angle.

The view factor: View factor is a parameter that accounts for the effects of orientation on radiation between surfaces.

the heat exchange between the two black surfaces: the radiation heat transfer between black bodies is total, because all the radiant energy which strikes a surface is absorbed (reflectivity = 0)

the heat exchange between the two gray surfaces: Considering gray bodies we can say that all the radiant energy which strikes a surface will not be absorbed as in the black body. In this case part will be reflected back to another surface, and part will be reflected out of the system entirely.

Task II

E_1= 0.1

T_1=800K

E_2= 0.1

T_2=500K

$Q= A (T^4_{1} - T^4_{2}) / {}_{1/E1 + 1/E2 -1}$

$Q= 5{,}67 \times 10^{-8} (800^4 - 500^4) / {}_{1/0.1 + 1/0.1 -1}$

Q= 1,035.8 W

Through this we can say that the emissivity and radiative heat exchange are directly proportional, considering that few changes in terms of emissivity resulted in a relatively betterment in the heat transfer.