HEAT AND MASS TRANSFER

(120513)

Heat Transfer

Difference of temperature may result to heat flow or transfer to and from an object it can be through conduction, convection, radiation and evaporation.

Heat Transfer by Radiation

This heat transfer by radiation involves a form of energy known as electromagnetic radiation, which is produced by vibrating and accelerating electrical charges. When the electrons vibrate in an antenna, a radio wave is produced in a form up and down. The rate at which radiation propagates depend on the temperature T1 of the surface and the type of surface.

It can be calculated by:

Rate of emission Re =   = e δΔT14

Rate of absorption Ra =   = e δΔT24

The net radiative heat transfer rate may now calculated as follows:

$H_r = R_a - R_e$

$H_r = e\, \delta \Delta T_2^4 - e\, \delta \Delta T_1^4$

$H_r = e\, \delta \Delta\, (T_2^4 - T_1^4)$

Where

e − emissivity (a good quality ranging from 0 to 1)

A good emitter has e = 1

A poor emitter has e = 0

δ = Stefan Boltzman constant = 5.67 x 10⁻⁸ wattts /m K

T_2 − absolute temperature of the absorber

T_1 − absolute temperature of the emitter

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