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WEEK 4

Complete the modified example of simplified wall calculations and find the total heat transfer through wall.

$U_{tot} = U_{wood} * \frac{A_{wood}}{A_{tot}} + U_{ins} * \frac{A_{ins}}{A_{tot}} = 0.25 * U_{wood} + 0.75 * U_{ins}$

$U_{wood} = \frac{1}{R'_{wood}} = \frac{1}{1.109} = 0.9017$

$U_{ins} = \frac{1}{R'_{ins}} = \frac{1}{4.009} = 0.2494$

$U_{tot} = 0.25 * U_{wood} + 0.75 * U_{ins} = 0.25 * 0.9017 + 0.75 * 0.2494 = 0.4125\ W/m^2°C$

$A = 50*2.5*0.8 = 100$

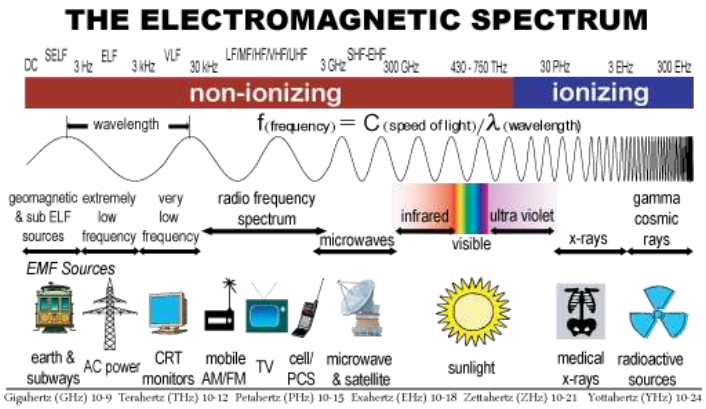
$Q_{tot} = U_{tot} * A_{tot} * \Delta T = 0.4125*100*24 = 990W$

Task 2: summary of Radiation and radiative heat transfer

Heat transfer by thermal radiation is transfer of heat by electromagnetic waves. While the conduction and convection depend on temperature differences to approximately the first power, the heat transfer by radiation depends on the differences of the individual body surface temperatures.

This is a type electromagnetic radiation no mass is exchanged and no medium is required in the process of radiation. Examples of radiation is the heat from the sun, or heat released from the filament of a light bulb.

The frequency of an electromagnetic wave can range from a few cycles to millions of cycles and higher per second. Einstein postulated another theory for electromagnetic radiation. Based on this theory, electromagnetic radiation is the propagation of a collection of discrete packets of energy called photons. In this view, each photon of frequency v is considered to have energy of e = hv = hc *f* h where h = 6.625 x 10−34 J.s is the Planck's constant.



Blackbody radiation

A blackbody is defined as a perfect emitter and absorber of radiation. At a specified temperature and wavelength, no surface can emit more energy than a blackbody. A blackbody is a diffuse emitter which means it emits radiation uniformly in all direction. Also, a blackbody absorbs all incident radiation regardless of wavelength and direction.