Week4 Zhou Yuhan

Task 1： you should complete the modified example of simplified wall calculations that you went through in the assignment of week 3 and find **the total heat transfer through wall**

Construction		Wood	Insulation
1	Outside surface(24Km/h wind)	0.03	0.03
2	Wood bevel lapped siding	0.14	0.14
3	Poly wood	0.11	0.11
4	Urethane Rigif Foam	No	0.98*90/25=3.528
5	Wood Studs	0.63	No
6	Gypsum Board	0.079	0.079
7	Inside Surface	0.12	0.12

R`with wood=0.03+0.14+0.11+0.63+0.079+0.12=1.109(m^2 ℃/W)

R`with insulation=0.03+0.14+0.11+3.528+0.079+0.12=4.007(m^2 ℃/W)

Uwood=1/R`withwood=1/1.109=0.9017(W/㎡℃)

Uinsulation=1/R`with insulation=1/4.007=0.2496(W/㎡℃)

Utotal=Uwood*Awood/Atotal+Uinsulation*Ainsulation

=0.25*Uwood+0.75*Uinsulation=0.4126(W/㎡℃)

The overall unit thermal resistance Rvalue= 1/Utotal= 1/0.4126= 2.4237(㎡℃/W)

The rate of heat loss through the walls

Qtotal=Utotal*Atotal*△T=0.416*50*2.5*(1-20%)*22-(-2)=990.24W

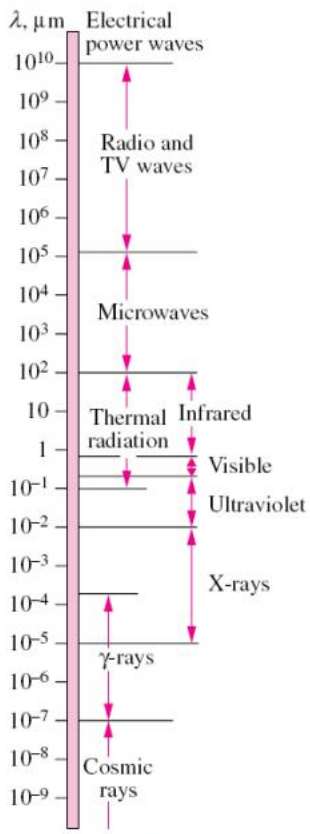
Task 2： In 2 pages you shoudl write a summary (in your own word!, in your own words !!) of what you have learnt in this session about radiation and radiative heat transfer

Radiation

Definition: Energy produced by thermal motion in the form of electromagnetic waves.Everything around us constantly emits thermal radiation.

Note: Thermal radiation continuously converts thermal energy into radiant energy. In order to achieve the law of conservation of energy, it is also necessary to continuously absorb the heat radiation that the surrounding objects project onto its surface and become heat energy.Radiation heat transfer refers to the total effect of mutual radiation and absorption between objects.Radiation heat transfer is zero, but thermal radiation is still ongoing.

Thermal Radiation



The electromagnetic wave spectrum.

Thermal radiation is a phenomenon in which an object radiates electromagnetic waves due to its temperature. It is a heat transfer method in which an object radiates heat outward in the form of electromagnetic radiation. It does not depend on any external conditions. It is one of the three main ways of conducting heat. All objects with temperatures above absolute zero can generate heat radiation. The higher the temperature, the greater the total energy radiated and the more short-wave components.

In the spectrum, a wavelength from 0.76 to 400 μm is called "infrared", and infrared is invisible. All substances above absolute zero (-273.15 ° C) can produce infrared light. The higher the temperature, the stronger the ability to emit thermal radiation. The number of thermal spokes does not depend on the intermediate medium, it can propagate in vacuum, and the transmission rate is the highest. The heat transfer between objects in the form of heat radiation is two-way, and the faster the ability to emit heat radiation, the faster the ability to absorb heat radiation. Infrared is also divided into: "near-infrared" or short-wave infrared, wavelength 0.76-1.5 microns, deep into the human body, about 5-10 mm; "far infrared" or long-wave infrared, wavelength 1.5-400 microns, more The superficial skin is absorbed and the penetration depth is less than 2 mm.