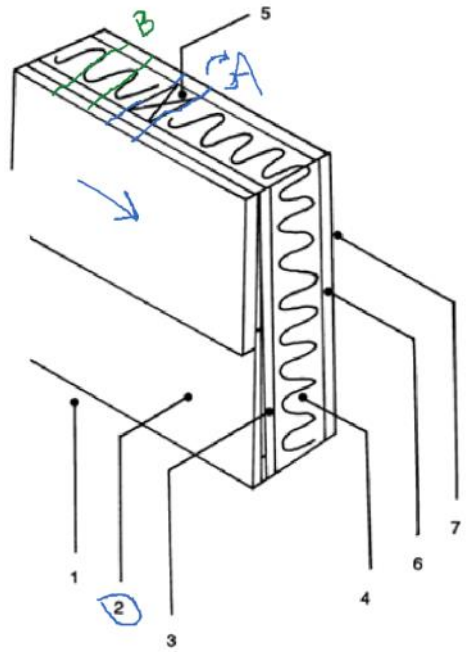
Submission 4

martedì 29 ottobre 2019
11:41

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

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 heat transfer

- Determine the overall unit thermal resistance (the *R*-value) and the overall heat transfer coefficient (the *U*-factor) of a wood frame wall that is built around 38-mm 90-mm wood studs with a center-to-center distance of 400 mm. The 90-mm-wide cavity between the studs is filled with glass fiber insulation. The inside is finished with 13-mm gypsum wallboard and the outside with 13 mm wood fiberboard and 13-mm 200-mm wood bevel lapped siding. The insulated cavity constitutes 75 percent of the heat transmission area while the studs, plates, and sills constitute 21 percent. The headers constitute 4 of the area, and they can be treated as studs (this means 75% of area is insulation and 25% can be considered wood)
  Also, determine the rate of heat loss through the walls of a house whose perimeter is 50 m and wall height is m in Las Vegas, Nevada, whose winter design temperature is -2 C. Take the indoor design temperature to be C and assume 20 percent of the wall area is occupied by glazing. $A = 50 * 2.5 * 0.8 = 100\, m^2, \Delta T = 22 - (-2) = 24°C$



	Section A	Section B
Outside air	0,03	0,03
Wood bevel (13*200mm)	0,14	0,14
Plywood (13mm)	0,11	0,11
Urethane Rigif Foam (90mm)	-	0,98*90/25=
Wood Studs (90mm)	0,63	-
Gypsum board (13mm)	0,079	0,079
Inside surface	0,12	0,12

$$R'_{withWood} = 0.03 + 0.14 + 0.11 + 0.63 + 0.079 + 0.12 = 1.109\, m^2.° \frac{C}{W}$$
$$R'_{withIns} = 0.03 + 0.14 + 0.11 + 3.528 + 0.079 + 0.12 = 4.007 m^2.°C/W$$

$$U_{wood} = \frac{1}{R'_{wood}} = \frac{1}{1.109} = 0.9017\, \frac{W}{m^2 °C}$$

$$U_{ins} = \frac{1}{R'_{ins}} = \frac{1}{4.007} = 0.2495\ \frac{W}{m^{2}°C}$$

$$A_{tot} = 50 * 2.5 * 0.8 = 100m^2$$

$$U_{tot} = U_{wood} \times \frac{A_{wood}}{A_{tot}} + U_{ins} \times \frac{A_{ins}}{A_{tot}} = 0.9017X\frac{25}{100} + 0.2495X\frac{75}{100} =$$

$$= 0.2254 + 0.187 = 0.4125\frac{W}{m^{2}°C}$$

$$\Delta T = 22 - (-2) = 24°C$$

$$Q_{tot} = U_{tot}XA_{tot}X\,\Delta T = 0.4125\ X\ 100\ X\ 24 = 990W$$

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

Radiation is the emission of energy as electromagnetic waves or as moving particels, especially high-energy particels which cause ionization.
In terms of reality, radiation happens when an object in a vacuum chamber caols down, reaching thermal equilibrium with its surrounging.
The Radiation is different from conduction ond covection. So is not necessary the presence of a medium material to take place.
Radiation occurs in solids, gases and liquids.
Electromagnetic waves transport energy and they are characterized by their or wavelenght.
The electromagnetic radiation, that is pertinent to heat transfer is the thermal radiation, that increases with the increase of temperature. Thermal energy is in all the area where the temperature is above 0.
The Balck body radiation is defined like a perfect emitter and absorber of radiation.
The radiation energy emitted by a black body is Eb(t)- aT^4 (W/m2)
Light is only the invisible portion of the electromagnetic spectrum that is between and 0.76um.