WEEK 3 ---KOU YU

1. Dfinlize the composite wall question by finding the heat transfer rate

(1) Total resistance of the wall:

Rtotal=Rconv1+Rfoam+Rplaster1+Rtotal'+Rplaster2

+Rconv2

1/Rtotal'=2/Rp+1/Rb

Rp=0.16/0.22*0.015=48.484(C/W)

Rb=0.16/0.72*0.22=1.0101(C/W)

1/Rtotal'=2*1.01+48.48/48.48*1.01=1.03(C/W)

Rtotal'=0.97(C/W)

Rtotal=1/(10*0.25)+0.03/(0.026*0.25)+0.02/(0.22*0.25)+0.97+0.02/(0.22*0.25)+

1/(40*0.25)

Rtotal=0.4+4.61+0.36+0.97+0.36+0.1= 6.8 (C/W)

(2) Rate of heat transfer through the wall

Q=(Tin1-Tout2)/Rtotal

Q=(20-(-10))/6.8=30/6.8=4.4117 (W)

2. Solve the same question while the thickness of the brick is increased to 32 cm and comment on the results

(1) Total resistance of the wall

1/Rtotal'=2/Rp+1/Rb

Rp=0.32/0.22*0.015=96.97(C/W)

Rb=0.32/0.72*0.22=2.02(C/W)

1/Rtotal'=2*2.02+96.97/96.97*2.02=0.514(C/W)

Rtotal'=1.95(C/W)

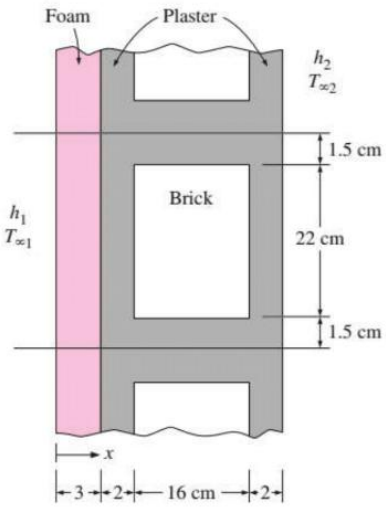
Rtotal=1/(10*0.25)+0.03/(0.026*0.25)+0.02/(0.22*0.25)+1.95+0.02/(0.22

*0.25)+1/(40*0.25)=7.78(C/W)

(2)Rate of heat transfer through the wall

Q=(Tin1-Tout2)/Rtotal

Q=(20-(-10))/7.78=30/7.78=3.856 (W)



Therefore,Q(16cm）=4.4117 (W)，Q（32cm）=3.856 (W)

Doubled the thickness of the wall, Rtotal' has also doubled.

And the heat transfer rate Reduced by 0.6 ,If want to reduce the heat transfer rate, it is not enough to increase the wall thickness.

3.Solve again the simplified wall calculation procedure replacing the glass fiber one with urethane rigif foam andwhile replacing the fiberboard with plywood and find the two R_unit values.

	Wood	Insulation
Outside Air	0.03	0.03
Wood bevel (13*200 (mm)	0.14	0.14
Plywood (13mm)	0.11	0.11
Urethane rigid foam (90mm)	-	0.98*(90/25)=3.528
Wood studs (90mm)	0.63	-
Gypsum (13mm)	0.079	0.079
Inside air	0.12	0.12

R wood= 0.03+0.14+0.11+0.63+0.079+0.12=1.109 (m2C/W)

R insulation= 0.03+0.14+0.11+3.528+0.079+0.12=4.007 (m2C/W)