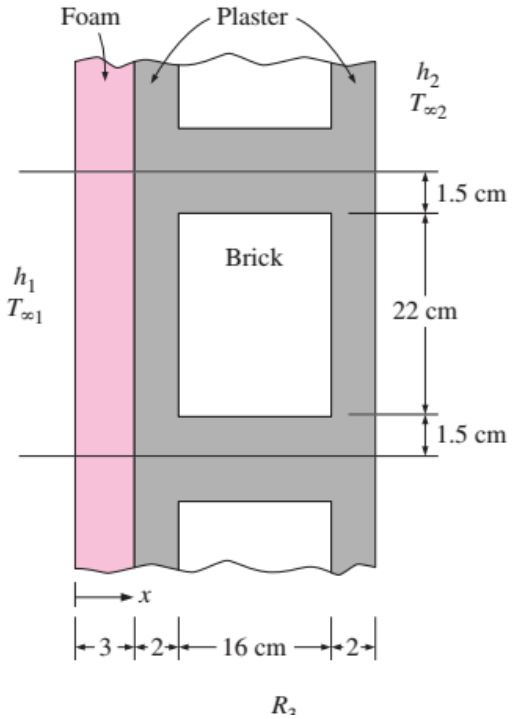
Week 3

In this week's assignment you should first dfinlize the composite wall question by finding the heat transfer rate, and then solve the same question while the thickness of the brick is increased to 32 cm and comment on the results.



Ri=0.4c/w

Rp=4.615 c/w

Rp=0.363 c/w

Rpt=0.97 c/w

Ro=0.1 c/w

Rt=6.84 c/w

$$Q = \frac{\Delta T}{R_{Tot}} = \frac{10 - 25}{6.84} = -2.19\ W$$

$$R_{p_{c_1}} = R_{p_{c_2}} = \frac{L_{p_{c_1}}}{k_p \times A_{p_{c_1}}} = \frac{0.32}{0.22 * 0.015} = 96\ °C/W$$

$$R_b = \frac{L_b}{k_b \times A_b} = \frac{0.23}{0.72 * 0.22} = 2.025\ °C/W$$

$$\frac{1}{R_{tot_{parallel}}} = \frac{1}{R_b} + \frac{1}{R_{p_{c_1}}} + \frac{1}{R_{p_{c_2}}} = \frac{1}{2.025} + 2 * \left(\frac{1}{96}\right) = 6.349\ °C/W$$

$$\rightarrow \frac{1}{R_{tot_{parallel}}} = 6.349\ W/°C \longrightarrow R_{tot_{parallel}} = \frac{1}{6.349} = 0.157°C/W$$

$$R_{P_1} = R_{P_2} = \frac{L_{p_1}}{k_p \times A_{p_1}} = \frac{0.02}{(0.22*0.25)} = 0.363\ °C/W$$

$$R_o = \frac{1}{h_0 \times A} = \frac{1}{40 * 0.25} = 0.1\ °C/W$$

$$R_{total} = R_i + R_o + 2 * R_{P_1} + R_{tot_{parallel}} + R_{foam}$$

$$R_{total} = 5.635 \circ \frac{C}{W}$$

$$Q^{\cdot} = \frac{\Delta T}{R_{Tot}} = \frac{10 - 25}{5.635} = -2.661\ W$$

- You should 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 l.	0.14	0.14
plywood (13mm)	0.11	0.11
urethane rigif foam	No	0.098*90/25= 0.3528
Wood studs	0.63	No
Gypsum board	0.079	0.079
Inside surface	0.12	0.12
R_unit values	1.109m².c/w	0.8318