week2_MelissaMartinoli

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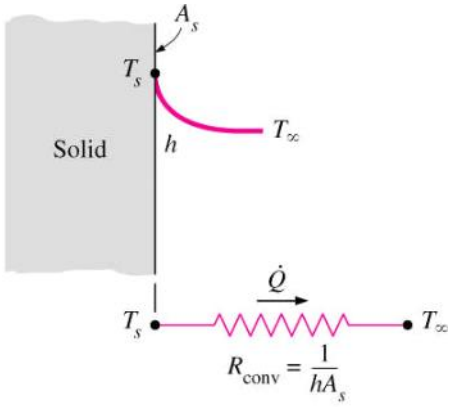
01a.Summary

Convective heat transfer is the movement of heat from one place to another, convection can be forced (assisted convection) or natural (free convection).
In a building, natural convective movements are generated both inside and outside and are due to the temperature differences to which the air is subjected.
Internally the air in a room meets colder wall surfaces and for this reason generates convective motions downwards; meanwhile, externally, the air comes into contact with warmer surfaces and for this reason generates convective motions upwards. We can say that the surface offers no resistance to convection.

The most usual approach to determinate the amount of heat transferred is the Newton's law of cooling:

$\dot{Q} = \frac{Ts - T\infty}{Rconv}$

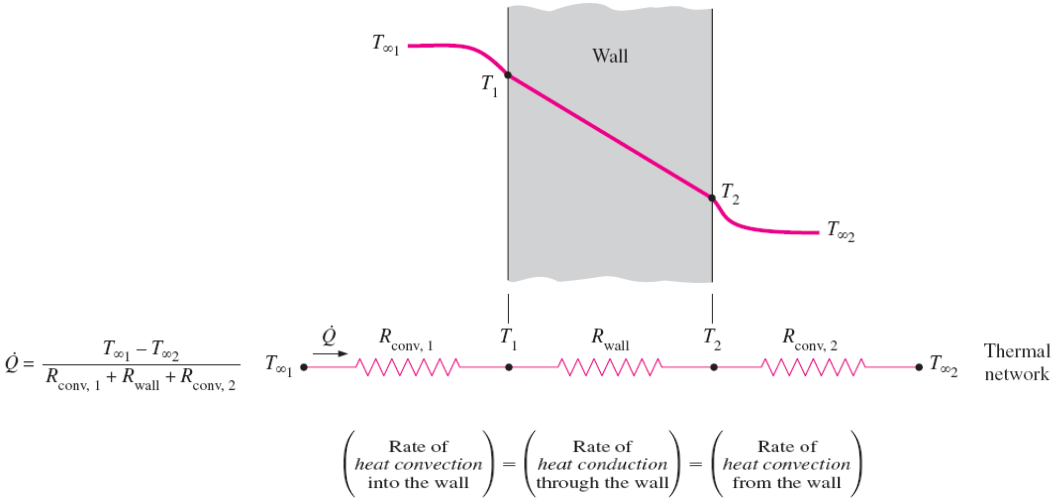


Ts = temperature of the surface
T∞ = temperature not affected by the wall
h = convective heat transfer coefficient

$Rconv = \frac{1}{hAs}$

From this formula we see that faster is the air, less is the convection resistance of the surface.

During the heat transfer through a wall we can also notice that two situations occur: conduction and convection.



In the formula we have to calculate all the Resistances: $\dot{Q} = \frac{Ts - T\infty}{Rtotal}$

where Rtotal is: $R_{conv\,1} + R_{wall} + R_{conv\,2} = \frac{1}{hAs} + \frac{L}{KA} + \frac{1}{hAs}$

The formula is similar even if we have to calculate the heat loss through two neighboring walls and a double pane window, in this second case we have to consider the Resistance of the airgap.

01b.Why increasing the thickness of a single pane glass does not increase the total resistance?
Changing the thickness of a single pane glass does not affect the total resistance, because the Resistance value obtained is smaller compared with the Resistance of convection, therefore also the Rtotal doesn't have substantial changes.

03.Solve the same probelm as that of double pane window with with the air-gap thickness of 13 mm and glass thickness of 6 mm, commment on your results and explain why we have an optimal range for the air-gap's distance