Week 2

Name: LIU JIAJI Personal Code: 10703308

1. Summary

Convective heat transfer refers to the process of transferring heat from one place to another, and ultimately the final result temperature tends to be uniform. It is a basic way of heat transfer.

Due to different reasons, there are two types of natural convection and forced convection. Natural convection heat transfer. It refers to the flow caused by the non-uniform temperature field of the fluid without relying on external forces such as pumps or fans. The fluid participating in the heat exchange forms a density difference due to the uneven temperature of each part, thereby generating a convective heat transfer phenomenon caused by the floating force in the gravity field or other force fields. Convection of liquid or gas under the influence of external forces. For example, liquid can be convected by the action of a pump or agitator and by the action of a gas under the action of a blower.

Convective heat transfer is usually described by Newton's law of cooling, that is, when the fluid with a body temperature of tf is heated by a hot wall of temperature tw, the heating amount per unit area can be expressed as q = a (tw - tf), when the body temperature When the fluid of tf is cooled by the cold wall with a temperature of tw, q=a(tf-tw) where q is the heat flux for convective heat transfer, W/m2; a is the proportional coefficient, called the convective heat transfer coefficient. W / (m2 · ° C). The Newtonian cooling formula shows that the convective heat transfer rate per unit area is proportional to the temperature difference.

The reason why the thickness of a single pane glass does not increase the total resistane.Because glass is a non-metallic material, although its thermal conductivity is only 0.8W / (m2 · K) - 1.0W / (m2 · K), far less than metal, but because the thickness of glass is generally 3mm ~ 6mm, its own thermal resistance Very small, almost negligible.

1. About the mistake

Calculation error

1. Exercise

T1=20℃, T4=-10℃

k(glass)=0.78 W/m·℃,

K(air)=0.026 W/m·℃

h1=10W/m2℃,

h2=40W/m2℃

0.8 high and 1.5 width

L(glass)=0.006m, L(air)=0.013m

A=0.8x1.5=1.2 m2

Rtotal=Rconv,1+Rglass\*2+Rair+Rconv,2

=+\*2++

℃/w

No conductivity ，the air in the middle

When d = 13 mm, the heat transfer coefficient of the glass is at least 2.687 W/m2K. When the thickness of the glass air barrier is greater than 13 mm, the heat transfer coefficient of the glazing increases as the thickness of the air barrier increases. This is because as the glass air spacer increases, the air inside the glass increases heat transfer, while the ratio of thermal conductivity to radiation heat transfer decreases.