Sound of Science
(理聲)

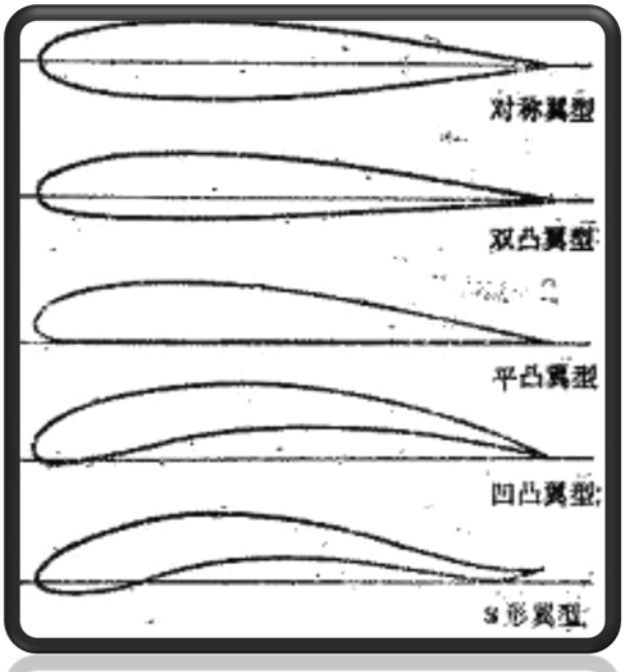
Newsletter of Science Society
October, 2013
二零一三年十月號

~~Triumph in the Skies~~

Have you ever watched a popular TV programme called “Triumph in the Skies 2”? It’s quite amazing that a heavy airplane can fly in the sky. It is believed that most of you would ask this questions, isn’t it? Let’s look at the information about the structure of an airplane first, or you’ll know how aero plane fly.

The structural parts of an aircraft are called airframe. The parts present can vary according to the aircraft's type and purpose. Early types were usually made of wood with fabric wing surfaces. When engines became available for powered flight around a hundred years ago, their mounts were made of metal. Then as speeds increased more, more parts became metal until by the end of WWII all-metal aircraft were common. In modern times, increasing use of composite materials has been made.

The wings of a fixed-wing aircraft are static planes extending either side of the aircraft. When the aircraft travels forwards, air flows over the wings which are shaped to create lift. Airplanes have flexible wing surfaces which are stretched across a frame and made rigid by the lift forces exerted by the airflow over them. Larger aircraft have rigid wing surfaces which provide additional strength. Whether flexible or rigid, most wings have a strong frame to give them their shape and to transfer lift from the wing surface to the rest of the aircraft. The main structural elements are one or more spars running from root to tip, and many ribs running from the leading (front) to the trailing (rear) edge. Early airplane engines had little power and light weight was very important. Also, early airfoil sections were very thin, and could not have strong frame installed within. So until the 1930s most wings were too light weight to have enough strength and external bracing struts and wires were added. When the available engine power increased during the 1920s and 30s, wings could be made heavy and strong enough that bracing was not needed any more.



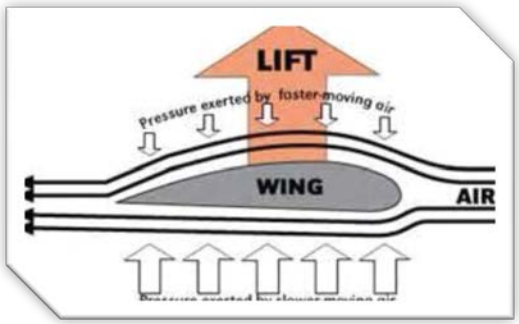
The number and shape of the wings varies widely on different types. A given wing plane may be full-span or divided by a central fuselage into port (left) and starboard (right) wings. Occasionally even more wings have been used, with the three-winged triplane achieving some fame in WWI. The four-wingedquadruplane and

other multiplane designs have had little success.A monoplane has a single wing plane, a biplane has two stacked one above the other, a tandem wing has two placed one behind the other. When the available engine power increased during the 1920s and 30s and bracing was no longer needed, the unbraced or cantilever monoplane became the most common form of powered type.

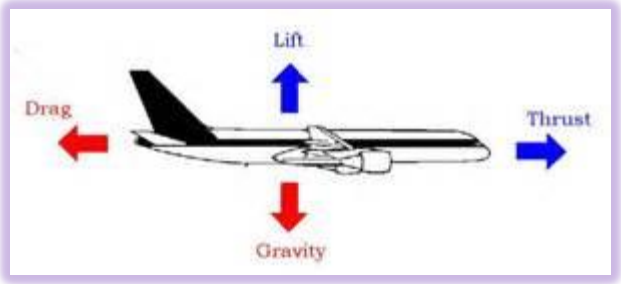
The wing planform is the shape when seen from above. To be aerodynamically efficient, a wing should be straight with a long span from side to side but have a short chord (high aspect ratio). But to be structurally efficient and hence light weight, a wing must have a short span but still enough area to provide lift (low aspect ratio).At transonic speeds (near the speed of sound), it helps to sweep the wing backwards or forwards to reduce drag from supersonic shock waves as they begin to form. The swept wing is just a straight wing swept backwards or forwards.

The delta wing is a triangle shape which may be used for a number of reasons. As a flexible Rogallo wing it allows a stable shape under aerodynamic forces, and so is often used for ultralight aircraft and even kites. As a supersonic wing it combines high strength with low drag and so is often used for fast jets.A variable geometry wing can be changed in flight to a different shape. The variable-sweep wing transforms between an efficient straight configuration for takeoff and landing, to a low-drag swept configuration for high-speed flight. Other forms of variable planform have been flown, but none have gone beyond the research stage.

A lifting body is a configuration in which the body itself produces lift. In contrast to a flying wing, which is a wing with minimal or no conventional fuselage, a lifting body can be thought of as a fuselage with little or no conventional wing. Whereas a flying wing seeks to maximize cruise efficiency at subsonic speeds by eliminating non-lifting surfaces, lifting bodies generally minimize the drag and structure of a wing for subsonic, supersonic, and hypersonic flight, or, spacecraft re-entry. All of these flight regimes pose challenges for proper flight stability.



The classic airfoil section wing is unstable in flight and difficult to control. Flexible-wing types often rely on an anchor line or the weight of a pilot hanging beneath to maintain the correct attitude. Some free-flying types use an adapted airfoil that is stable, or other ingenious mechanisms including, most recently, electronic artificial stability. But in order to achieve trim, stability and control, most fixed-wing types have an empennage comprising a fin and rudder which act horizontally and a tailplane and elevator which act vertically. This is so common that it is known as the conventional layout. Sometimes there may be two or more fins, spaced out along the tailplane. Some types have a horizontal "canard" foreplane ahead of the main wing, instead of behind it. This foreplane may contribute to the lift, the trim, or control of the aircraft, or to several of these.



The Shaw Prize in 2013

The Shaw Prize has been presented this year. Before the introduction of the laureates of the Prizes, you may know the nomination rules of the Prize.

1. Nominations for The Shaw Prize shall only be submitted by invited nominators Self nominations or nominations by invited persons shall be discarded.

2. The nomination of a person already deceased shall not be considered.

3. A nomination shall be valid only if it is received by the Shaw Prize Secretariat on or before the deadline stated in the invitation letter and on the nomination form.

4. A nomination may be invalidated if it does not comply with the rules stipulated in the invitation letter and on the nomination form.

5. A nomination validly submitted and accepted in a nomination year shall be considered only for that particular year. A nomination year means the period between two nomination invitations.

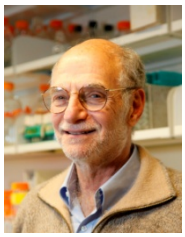
So, now we'll introduce the laureates this year.

For the Astronomy Award, there are two laureates have got this award.

They're Steven Balbus and John Hawley. The award is for their discovery and study of the magneto rotational instability, and for demonstrating that this instability leads to turbulence and is a viable mechanism for angular momentum transport in astrophysical accretion disks.


For the Science & Medicine Award, there are totally three laureates have got this award.

They're Jeffrey Hall, Michael Rosbash and Michael Young. The prize presented is for their discovery of molecular mechanisms underlying circadian rhythms.


For the Chemical Science Award, there's only one laureate has got this prize.

He's David Donoho. The prize presented is for his profound contributions to modern mathematical statistics and in particular the development of optimal algorithms for statistical estimation in the presence of noise and of efficient techniques for sparse representation and recovery in large data-sets.

RELAXING TIME!

Our coming competition is called “Egg Snipper” (神蛋追擊) on 22/10(Tue)

For more details, please refer to our poster posted in your classroom.
If you have any enquiries, please ask our chairperson, 5E Wan Chi Yeung

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Don’t miss this golden chance!!!

Enjoy the competition

Comic Corner

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