

Why theory of flight fails to get off the ground

BY ROBERT UHLIG
TECHNOLOGY CORRESPONDENT

THE Wright brothers would never have left the ground had they listened to modern aerodynamics experts, a leading physicist claims today.

David Anderson, an American government researcher, believes that since the first powered flight 98 years ago near Kitty Hawk in North Carolina, generations of students and aircraft designers have been misled by an incorrect explanation of the forces that keep planes in the air.

It has led to a fierce dispute between mathematicians and physicists over the best way

to explain how aircraft wings work.

Dr Anderson claims in a report in *New Scientist* that mathematicians, whose theory has had the upper hand until now, are fundamentally wrong.

He said: "The standard explanation of how we fly is mostly myth. It's just wrong, but it has such a life of its own that you even see it on Nasa websites and in physics books."

Dr Anderson says Isaac Newton's laws of motion, postulated in the 17th century, provide a much better explanation of why planes fly than the latest computer calculations of fluid dynamic analysis, a branch of advanced

mathematics. The popular explanation of flight, known as the Bernoulli principle, is that wings are sucked upwards because air has to move faster over the longer, top surface than over the bottom surface of the wing.

The faster moving air creates lower pressure above the wing than below it, and the wing is "sucked" upwards.

But Dr Anderson says there is a crucial flaw in this theory: "If the shape of a wing determined lift, you could never fly upside-down."

His explanation is that the shape of the wing does not matter because the angle of the wing to the oncoming air determines how well it lifts the plane.

Wings are forced upwards because they are tilted, which deflects air down, Dr Anderson says. Even the air flowing along the top of the wing is pushed down because of a phenomenon called the Coanda effect, which causes air to stick to the wing's surface.

"The shape of the wing is the least important factor," he said. "Many fighters now have wings that are almost flat."

Using Newton's explanation of lift, planes can fly upside down provided the pilot makes sure that the angle of the wing ensures that air is deflected downwards.

"If you look at a plane flying upside down, that's what happens. The pilot pushes the nose upwards, so that the wing attacks the air as if the plane was flying the right way up," Dr Anderson said.

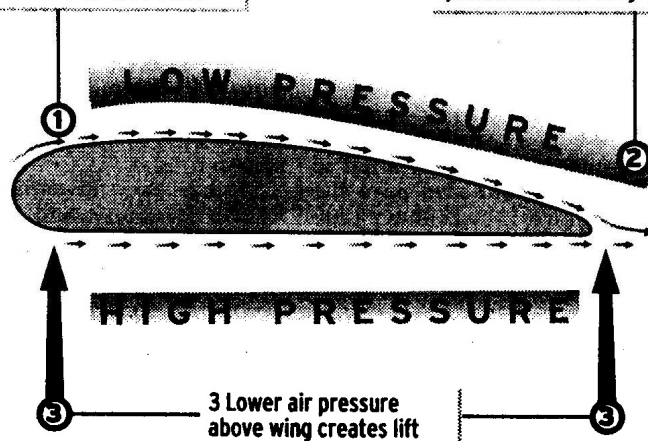
Engineers have accepted both the Bernoulli and Newton explanations of how wings work, but Dr Anderson said they would now have to discard the Bernoulli principle.

"Like the Wright Brothers, most aeronautical engineers use more experience than calculation when designing an aeroplane. Bernoulli is useful in calculation, but it doesn't explain lift," he said.

Bernoulli principle

1 Air moves over curved surface of the wing faster than flat surface below

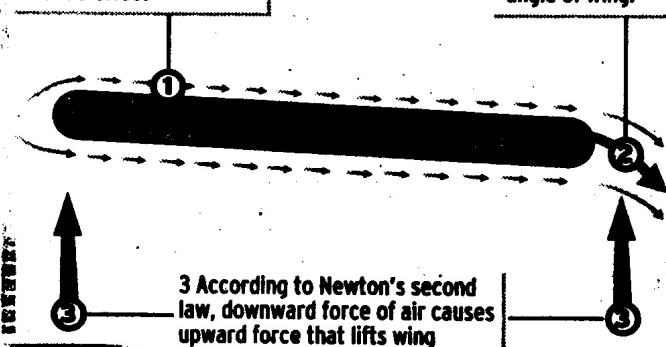
2 When air moves faster it creates less pressure above wing



Anderson principle

1 Moving air sticks to surface of wing, known as Coanda effect

2 Air is deflected downwards by angle of wing.



The Emperor has no clothes. All through a Cambridge degree in engineering, t3echnical service in the RAF and a full technical career, I failed to rumble the nonsense about flight. Obviously, when you see a plane flying upside down, you must deduce that flight is not achieved by differential shape between top and bottom wing surface. The controlling theory should be Newton's second law. Downwards momentum is given to the air. Ivor Catt, 7 May 2001