

This short presentation aims to offer the audience a brief explanation about the physical principles that allow a plane to fly. It starts from assuming that the public has a general idea of physics and a certain understanding of fluid mechanics.

From that point, the first thing to be explained is that the forward flying motion of an aircraft requires two different forces: thrust and lift. The thrust force gives the plane a forward motion, coming from the Newton's action-reaction principle and it is obviously provided by the engines.

The other key force is the lift. The basic principle on which the lift is based is that a change in velocity (this is, an acceleration) generates a force. Taking into account the Magnus effect, a flow tends to stick to the surface of a body when it encounters it. Thus, the wings of an aircraft are designed so their geometry creates a specific change in the velocity of the upcoming flow, accelerating the flow in the upper part of the wing and decelerating it in the lower part.

By applying Bernoulli's equation, the accelerated flow at the top gives a lower pressure than the decelerated flow at the bottom. This difference of pressure, when integrated along the surface of the wings, gives a resultant force pointing upwards that keeps the plane in the air and that is the so called lift.

For the long presentation it would be interesting to explain the lifting line theory and the panel method used for computing the lift of a real wing.