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Editorial

Editorial note on Aircraft flight mechanics

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EDITORIAL

Fixed wing (gliders, aeroplanes) and rotary wing (helicopters) aircraft also need flight mechanics. In ICAO Document 9110, an aeroplane is described as "a power-driven heavier than air aircraft, deriving its lift chiefly from aerodynamic reactions on surface that remain fixed under given flight conditions." Only a series of aerodynamic forces can propel a heavier-than-air craft (aircraft) into the air. The fuselage of a fixed-wing aircraft keeps up the wings before takeoff in fixed-wing aircraft. The opposite occurs at takeoff, with the wings supporting the plane in flight. A powered aircraft is affected by four forces when in flight: lift, weight, thrust, and drag. Thrust is the force produced by an engine (whether it's a jet engine, a propeller, or — in unusual cases like the X-15 — a rocket) that acts in a forward direction to overcome drag. Lift is less than weight in straight climbing flight. This seems to be incorrect at first since it seems that if an aircraft is climbing, lift must surpass weight. It is the thrust of an aircraft that helps it to ascend at a constant speed and gain extra potential energy. Lift is perpendicular to the vector that represents the aircraft's velocity in relation to the atmosphere.

The V-tail is a type of tailplane that has two fins angled away from each other in the shape of a V, rather than the traditional inverted T or T-tail. The control surfaces then act as both rudders and elevators, moving in the desired direction.

An aircraft can change its orientation in relation to the moving air in one of three ways. Pitch (movement of the nose up or down, rotation around the transversal axis), roll (rotation around the longitudinal axis, that is, the axis that runs the length of the aircraft), and yaw (movement of the tail up or down, rotation around the longitudinal axis) are the three types of rotation (movement of the nose to left or right, rotation about the vertical axis).

A movable rudder-fin causes the ship to yaw. The size and direction of the force generated by the vertical surface changes as the rudder moves. This sideways force creates a yawing moment and then a yawing motion since the force is generated at a distance behind the centre of gravity. On a large aircraft, there may be multiple independent rudders on a single fin for protection and control.

The rear portion of the tailplane's horizontal stabiliser is hinged to create an elevator, which controls pitch. By turning the elevator control backwards, the pilot raises the elevator (to a negative camber position) and increases the downward force on the horizontal tail. The angle of attack on the wings was raised, causing the nose to pitch up and overall lift to rise.

In subsonic aircraft, the system of a fixed tail surface and moveable elevators is common. A stabilator, or all-moving tail surface, is commonly found on supersonic craft. The entire horizontal surface of the tail is shifted to adjust the pitch in this situation. One of the main innovations that allowed supersonic flight was this seemingly simple invention. Early attempts, when pilots were still learning the ropes.

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