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A literature survey on aerodynamics around aircraft

Abstract:

This document provides an overview of the Basics of Aerodynamics, encompassing the forces influencing the motion of objects through the air, with a focus on lift, thrust, drag, and weight/gravity. The discussion delves into the detailed components and principles of lift, examining Bernoulli's Principle, airfoil shape, angle of attack, critical angle, and the coefficient of lift (CL). Thrust generation is explored through combustion engines, including turbojet and turboprop engines, and key concepts such as thrust-to-weight ratio and thrust vectoring are highlighted.

Drag, a crucial factor in aircraft design and performance, is examined in terms of parasitic drag, form drag, skin friction, lift-induced drag, and wave drag. The document also outlines the various factors affecting drag, including velocity, surface area, shape, air density, and viscosity. The coefficient of drag (CD) is introduced as a quantifying parameter.

Weight, generated by the gravitational attraction of the Earth on an aircraft, is discussed in terms of the center of gravity and its significance for stability and control. The determination of an aircraft's weight distribution and the calculation of weight using Newton's equation are explained.

The document concludes with a description of the parts of an airplane, including the fuselage, wings, flaps, spoilers, ailerons, winglets, empennage, and turbine/engine. Additionally, the steps in a flight mission are outlined, covering pre-flight preparation, takeoff, climb, cruise, descent and approach, landing, and taxi to the gate. Overall, this comprehensive overview serves as an informative guide to the fundamental principles and components of aerodynamics in the context of aviation.

Keywords: Aerodynamics, Lift, Thrust, Drag, Weight, Bernoulli's Principle, Airfoil, Angle of Attack, Coefficient of Lift (CL), Combustion Engines, Turbojet Engines, Turboprop Engines, Thrust-to-Weight Ratio, Thrust Vectoring, Parasitic Drag, Form Drag, Skin Friction, Lift-Induced Drag, Wave Drag, Velocity, Surface Area, Shape, Air Density, Viscosity, Coefficient of Drag (CD), Center of Gravity (CG), Fuselage, Wings, Flaps, Spoilers, Ailerons, Winglets, Empennage, Turbine/Engine, Pre-flight Preparation, Takeoff, Climb, Cruise, Descent and Approach, Landing, Taxi to Gate