Answer on Question #48203, Engineering, Other

Task:

What are the common formulas for Lift & Drag?

What do they depend on? Give example use of the equations.

Answer:

$Lift=C_l*(r*V^2)*A/2$

$Drag=C_d*(r*V^2)*A/2$

$C_d=C_{d0}+C_l^2/(pi*AR*e)$

Here are the variables.

Cl=lift coefficient

V=velocity

r=density

A=area

Cd=drag coefficient

AR = ratio of the wing.

That is, lift depends on a pressure difference between the top and bottom of the wing, airfoil shape, air density, and airspeed. Similarly pressure drag depends on pressure differences,the Reynolds number. Therefore the relevant differential pressures are zero plus important terms proportional to $½rV^2$. Meanwhile, the relevant pressures are proportional to the total density, which is some big number plus or minus unimportant terms proportional to $½ rV^2$.

In fluid dynamics, the drag coefficient is used to quantify the drag or resistance of an object in a fluid environment, such as air or water. It is used in the drag equation, where a lower drag coefficient indicates the object will have less aerodynamic or hydrodynamic drag.

The drag coefficient of any object comprises the effects of the two basic contributors to fluid dynamic drag: skin friction and form drag. The drag coefficient of a lifting airfoil or hydrofoil also includes the effects of lift-induced drag. The drag coefficient of a complete structure such as an aircraft also includes the effects of interference drag. The drag coefficient is a number that aerodynamicists use to model all of the complex dependencies of shape, inclination, and flow conditions on aircraft drag.