Sect. 1 Notes

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1 Basic Aerodynamic Principles

1.1 Vocabulary

- Pressure: limiting form of the force per unit area:

$$p = \lim \left(\frac{dF}{dA} \right)$$

  - Pressure is a point property; it can have different values within the fluid.

- Density:

$$\rho = \lim \frac{dm}{dv} \qquad dv \to 0$$

- Aerodynamics - fluids in motion is key; we use streamlines to represent them.
- Center of pressure - the location where the resultant of a distributed load effectively acts on an aerodynamic body.

1.2 Engineering applications of lift and drag coefficients

- Engineers are concerned with the coefficients of lift and drag and how they are changed inflight, unintentionally or intentionally.
- Certain devices can be used to intentionally change these coefficients, like flaps, slats, spoilers, etc.
- Lift and drag coefficients are constantly changing; they can depend on the airspeed, angle of attack, and many other factors. Thus, engineers must analyze and design aircraft based on empirical data.

2 Principles of Urbanism