

Control + Stability

Roll, Pitch + Yaw

lateral, longitudinal + Directional

axes.
Ailerons, Elevators + Rudder

Static + Dynamic

$$\Sigma F = 0 \quad \Sigma \tau = 0$$

i.e. equilibrium

Stable neutral Unstable

α_e = equilibrium angle of attack

$$M_{cg} = 0$$

= Trim

Partial Derivatives

Taking a derivative of an equation w/ multiple variables with respect to only one at a time.

$$f(x, y, z) = 6x^2 + 3y^3 + \frac{4}{z}$$

$$\frac{\partial f}{\partial x} = 12x + 0 + 0$$

$$f(x, y) = \frac{3x^2}{y^3}$$

$$\frac{\partial f}{\partial y} = 3x^2 y^{-3}$$

$$= (-3) 3x^2 y^{-4}$$

$$= -9x^2 y^{-4}$$

Moments

- M_{ac} = Moment about aerodynamic center
 - $M_{c/4}$ = Moment about $c/4$
 - M_{cg} = Moment about center of gravity.
- Independent of α
⇒ M_{ac} is also called
Zero lift moment

Read Design Box

562-563

↓ Historical Notes, pg 582-586