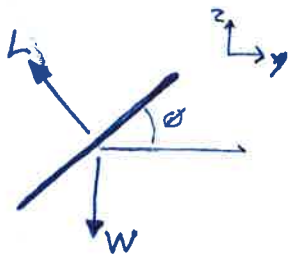


Aircraft Force Balance



Approximate relations

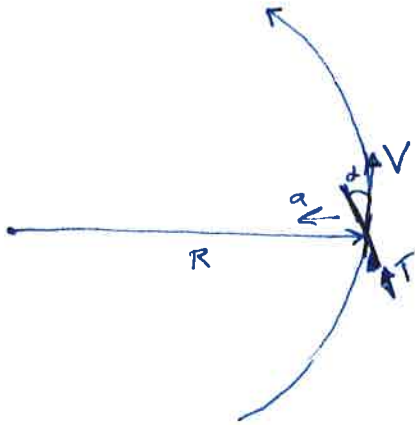
In z-direction, $L \cos \phi - W = 0$

In y-direction, $L \sin \phi = ma = m \frac{V^2}{R}$

But Thrust contributes to forces.

This is a fighter, so ϕ will be large.

I will ignore T component in z dir, but not T in y dir.



$$L \cos \phi - W = 0$$

$$L \sin \phi + T \sin \alpha \cos \phi = \frac{mV^2}{R}$$

Also in x-dir



$$C_D \rho S - T \cos \alpha = 0$$

Turn rate

$$t_r = \frac{360^\circ}{\text{time}} = \frac{360^\circ V}{2\pi R}$$

since we go around the full circle.

Given these constraints, minimize the time (aka. maximize turn rate)

The pilot chooses ϕ and α and V .

physics constrains C_L

" sets $C_D(C_L)$