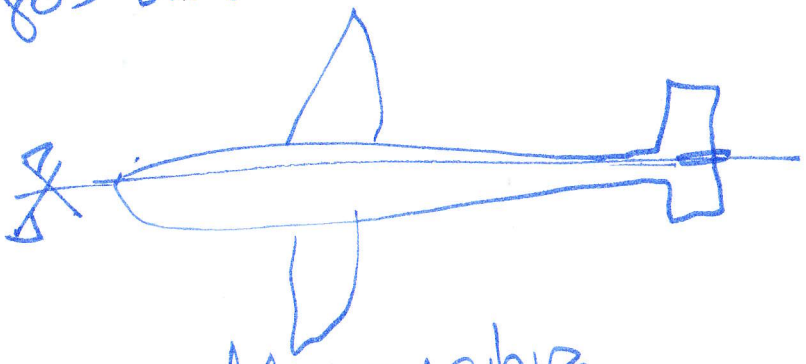
PME3554 25/09/2020

Cargas Aeronáuticas:

- Cargas simétricas



- Cargas de manobra
- Cargas de rajada.

Critérios de Projeto:

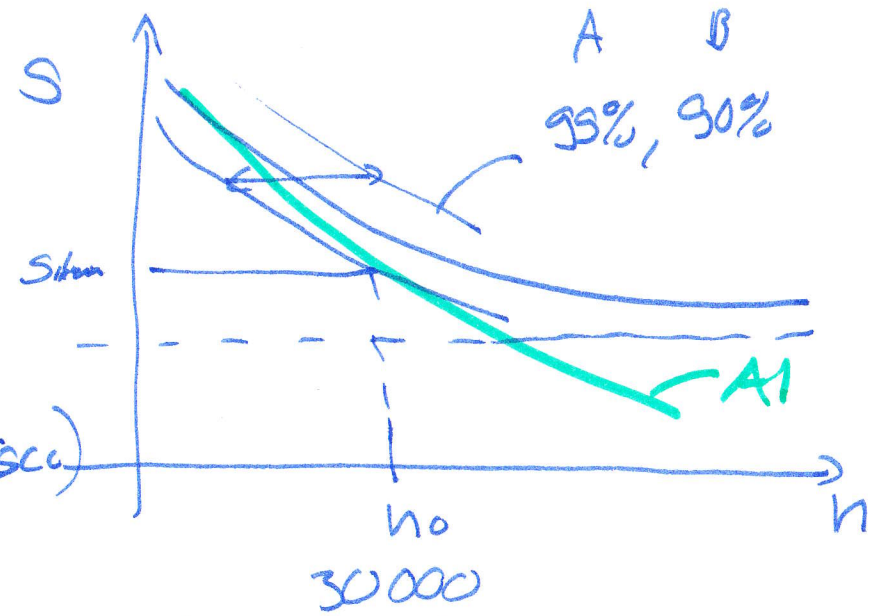
a) safe life

⇓

plano de manutenção

⇓

manutenção preventiva (estática)



b) Fail-safe

- redundância (hiperestática internamente)
- dano limitado

c) Damage Tolerant

mecânica da fratura - propagação de trinca.

⇓

plano de inspeção

⇓

manutenção preditiva (insp. e diagnóstico)

RCM

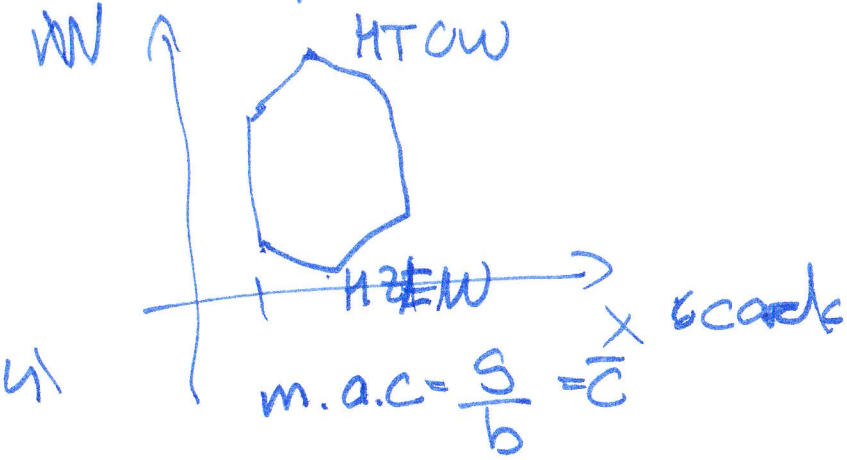
Cargos!

- cargos de voo
- cargos de inércia
- aterrissagem
- decolagem
- motores
- operação em pista
- outros

Peso:

MTW - maximum taxi gross weight
MTOW - maximum take off weight
MLW - maximum landing weight
MZFW - max. zero fuil weight
OZW - operating empty weight

→ "Envelope de CG"



Velocidade:

Velocido equivalente:

$$q = \frac{1}{2}\rho_0 V_E^2 \qquad \rho_0 V_E^2 = \rho V^2$$

$$q = \frac{1}{2}\rho V^2 \qquad V_E = V\sqrt{\frac{\rho}{\rho_0}}$$

e.a.s.

ρ_0 - des. ao nível do mar
ρ - dens. à h //

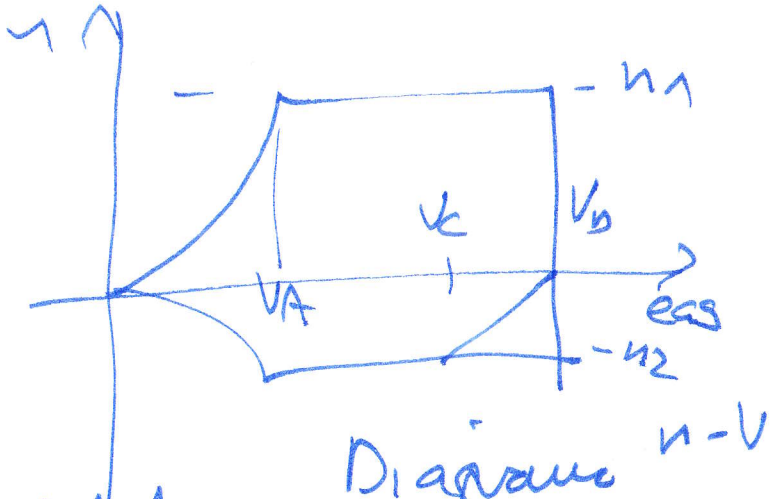
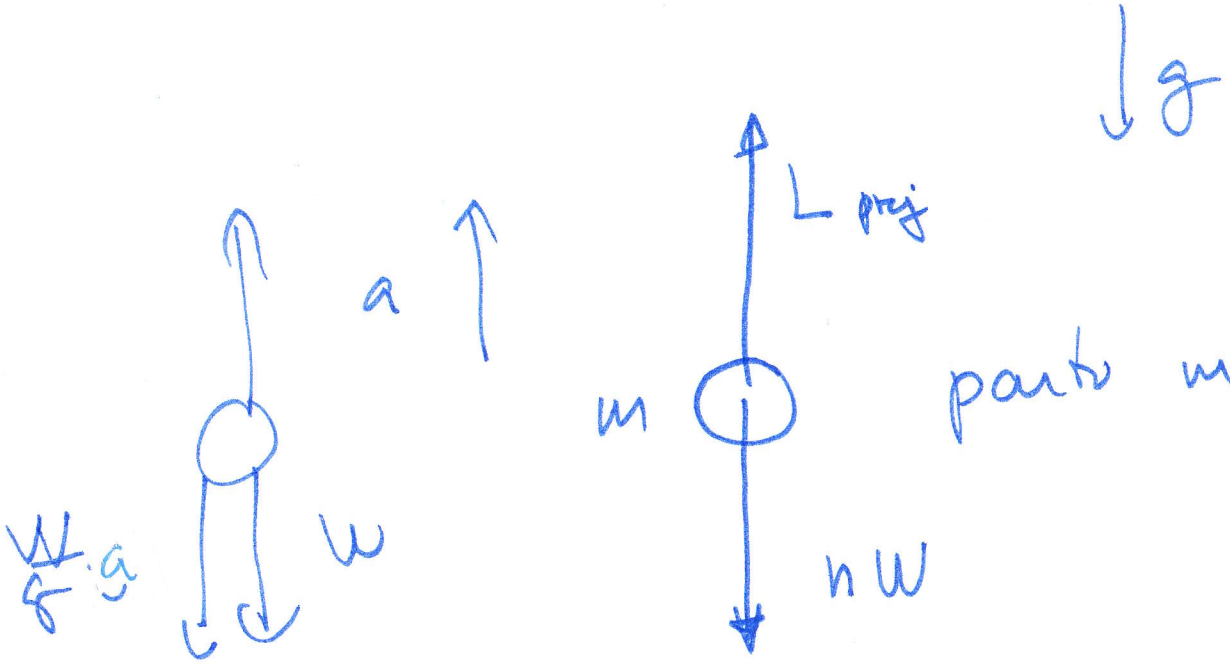


Diagrama n-V

equilíbrio dinâmico: (Princípio de D'Alembert)



2: Lei de Newton:

$$m = \frac{W}{g}$$

$$ma = L - W$$

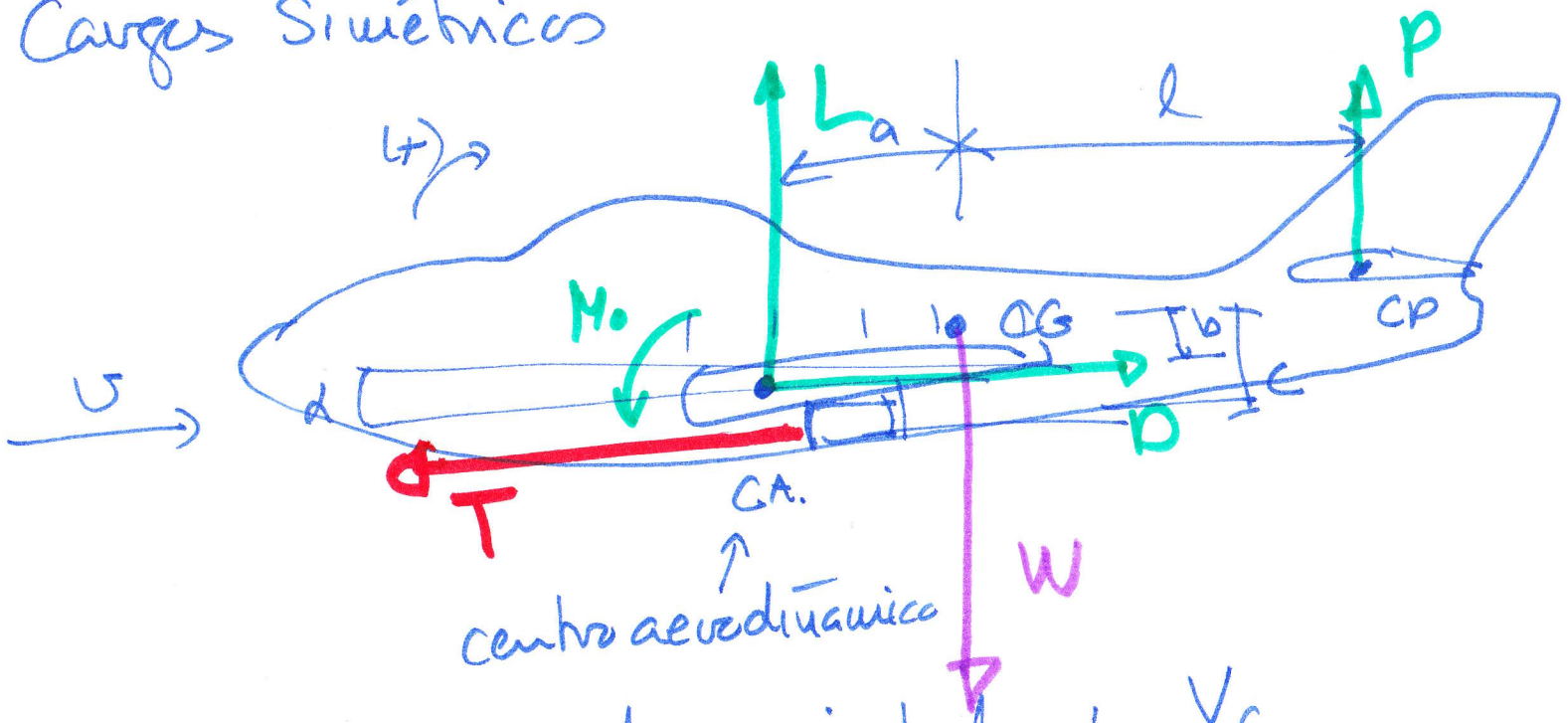
$$\frac{W}{g}a = L - W \Rightarrow L = \underbrace{\left(1 + \frac{a}{g}\right)}_{n} W$$

$$\boxed{L = nW}$$

$$n = 1 + \frac{a}{g}$$

$a > 0 \Rightarrow n > 1$

Cargas Simétricos



Vôo equilibrado e nivelado : V_c

($a=0$)

$V \sim$ $\quad L + P - W = 0$ (I)

$H \sim$ $\quad T - D = 0$ (II)

$M_{CG} \sim$ $\quad L.a - P.l - T.c - D.b - M_0 = 0$ (III)

(M_0: incógnita)

$V \rightarrow (\rho, L, D, M_0)$ curva de sustentação de cargas

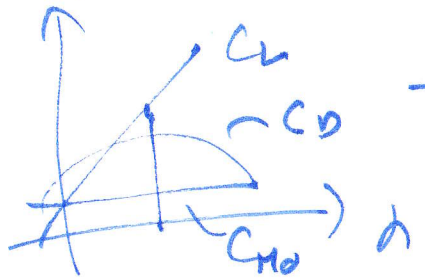
$L = \frac{1}{2} \rho C_L A V^2 \qquad D = \frac{1}{2} \rho C_D A V^2$

1º) $P \to 0$ (I) $\rightsquigarrow$ $L \simeq W$

$P \ll L$

$$L = \frac{1}{2} \rho V^2 S C_L \quad \text{—} \quad C_L$$

2º) $C_L, C_D, \alpha, C_{M_0}$



$\to C_D \to D = \frac{1}{2} \rho V^2 S C_D$

$\hookrightarrow$ (II) $\to T = D$ //

3º) (III) $P = \frac{L a}{l} - \frac{T c}{l} - \frac{D \cdot b}{l} - \frac{M_0}{l} \to P$

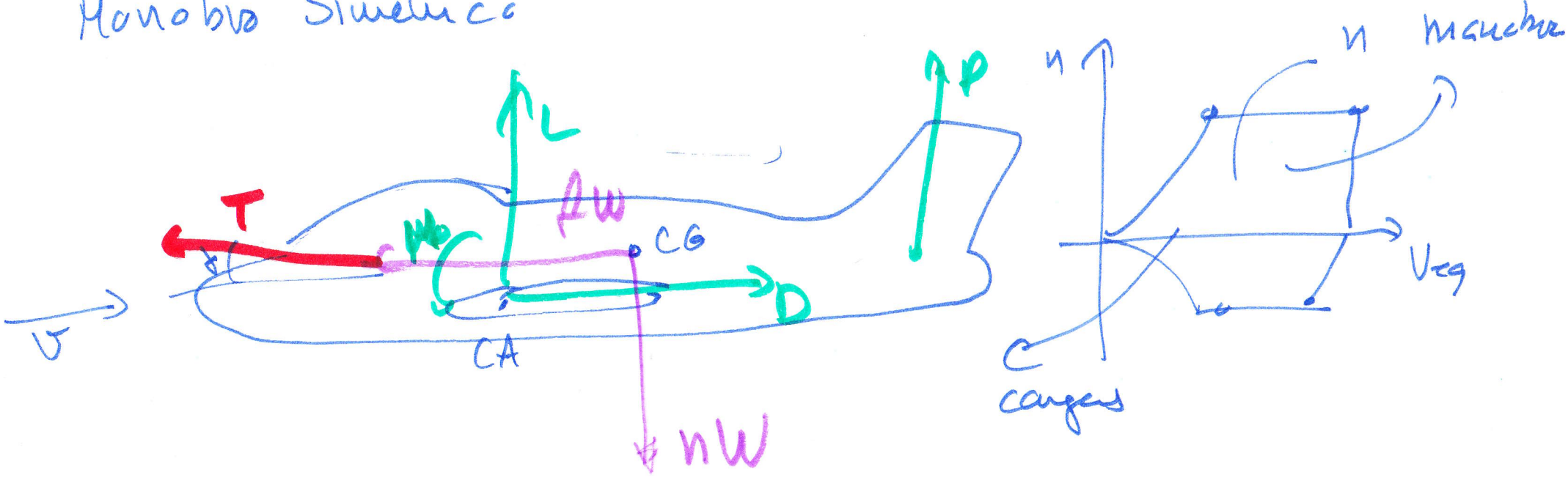
D, T pequeños $\simeq$ $P \simeq \frac{W a}{l} - \frac{M_0}{l}$

c.b pequeño

4º) (I) $\to$ $L = W - P$ //

3 ciclos

Monobra Simétrica



$n = 1 + a/g$

$f = \frac{a_t}{g}$

(I) $L + P = nW$

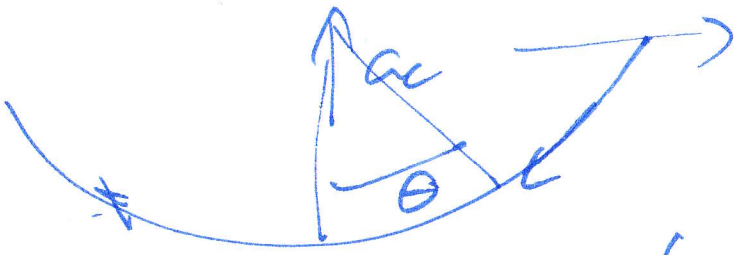
(II) $T\cos\gamma - D + fW = 0$

(VII) $M_{CG} = 0$ // (inércia à rotação desprezível)

↳ atitude.

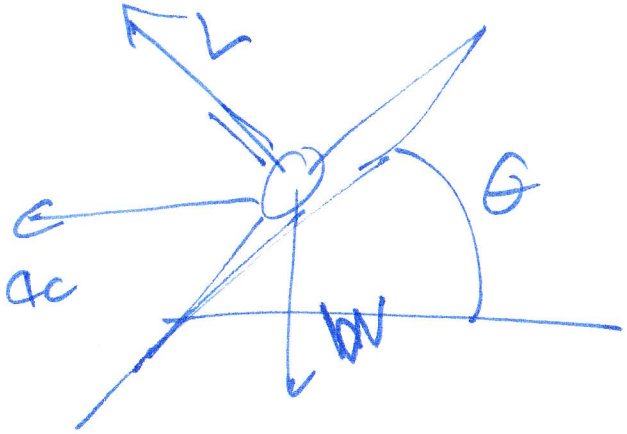
equilíbrio.

$n \to 0$



$n > 1$ retenido

← geometría demasiado

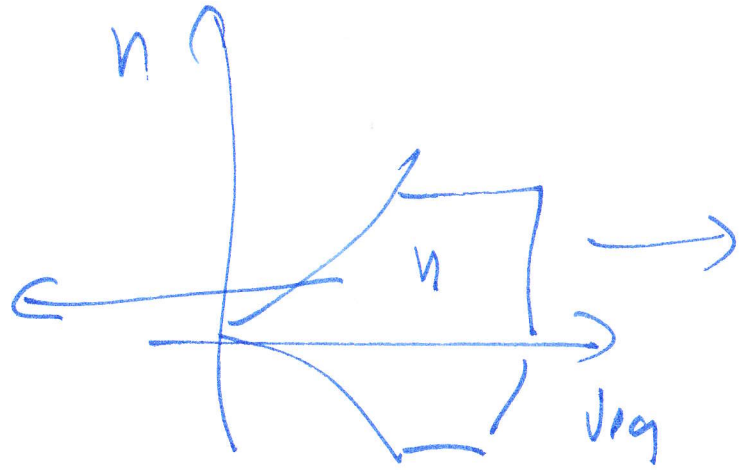


a_c

R, 5 //

Monobra Simétrica

Rigidez



L, P, D, Mo

↓

cálculo estructural

monobra

↓ a_c, a

U, R.