TEMA 3: CENTROS DE GRAVEDAD

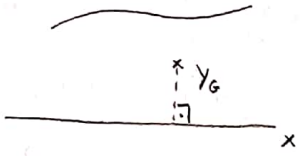
- $$x_G = \frac{\sum m_i x_i}{\sum m_i}$$

$$m = \begin{cases} \delta \cdot V \\ \sigma \cdot A \\ \lambda \cdot L \end{cases}$$

$$\delta = \frac{M}{V}$$
$$\sigma = \frac{M}{A}$$
$$\lambda = \frac{M}{L}$$

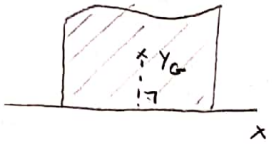
- PAPUS - GULDING

Ⓘ LINEA PLANA:



$$S = L \cdot 2\pi \cdot Y_G$$ (PERPENDICULAR)

Ⓘ AREA PLANA



$$V = A \cdot 2\pi \cdot Y_G$$ (PERPENDICULAR)

TEMA 5: ESTATICA SOLIDO RIGIDO

- BARRA UNICA CON APOYO ⟶ TRABAJA AXIALMENTE:

1 REACCIÓN

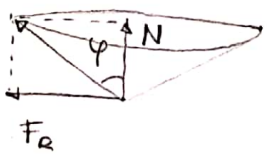
- ROZAMIENTO:

$$F_R \leq f \cdot N$$

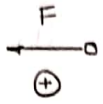
- EQUILIBRIO ESTRICTO

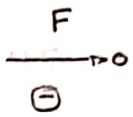
$$F_R^{MAX} = f_{min} \cdot N$$

$$\tan \varphi = \frac{F_R}{N} = f$$



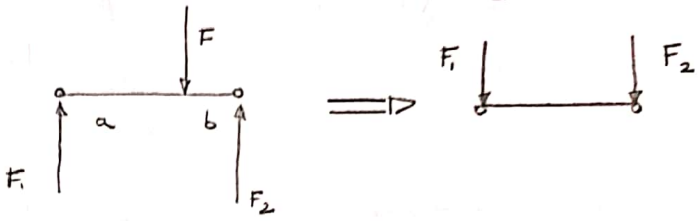
TEMA 6: CELOSÍAS

- TRACCIÓN: 

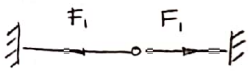
- COMPRESIÓN: 

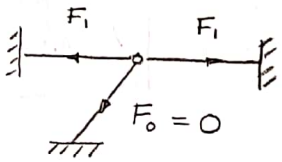
- DISTRIBUIR FUERZA:

$$F_1 = \frac{F \cdot b}{a+b} \qquad F_2 = \frac{F\,a}{a+b}$$



- CONDICIONES DE CARGA PARTICULAR

  - BARRAS ALINEADAS TRABAJAN IGUAL: 

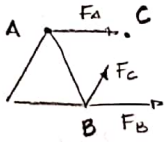
  - BARRAS NO ALINEADAS NO TRABAJAN: 

- METODOS DE CALCULO:

  A) METODO DE NUDOS: 

  B) METODO DE LAS SECCIONES:

  - CORTE



$$\left.\begin{array}{l} \Sigma M_C \rightarrow F_B \\ \Sigma M_B \rightarrow F_A \\ \Sigma F_\perp \rightarrow F_C \end{array}\right\}$$

$\perp$ A LAS //

TEMA 7. SOLIDOS FUNICULARES

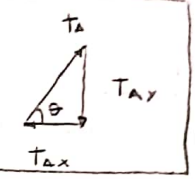
- $T_0 = K_{te}$ - T Tg al cable

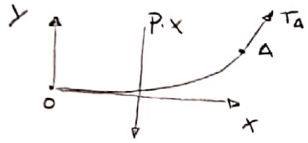
- CABLE CON CARGA DISTRIBUCIÓN EN ABCISAS

$$\frac{P}{T_0} = \frac{d^2y}{dx^2} \longrightarrow \text{PARABOLA} \quad y = \frac{P}{2T_0}x^2$$

$$P \cdot X = T_{Ay}$$

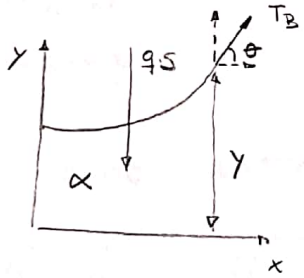
$$T_0 = T_{Ax}$$





$$S_{AB} = S_{OA} + S_{OB}$$

- CATENARIA



$$y = \frac{T_0}{q}\cosh\frac{q}{T_0}x \qquad \alpha = \frac{T_0}{q}$$

$$S = \alpha \operatorname{Sh}\alpha \qquad T_y = q \cdot S$$

$$y^2 = S^2 + \alpha^2$$

$$T = q \cdot y$$

$$\theta = \arctan\frac{S}{\alpha}$$

TEMA 9 ECUACIONES DEL MOVIMIENTO

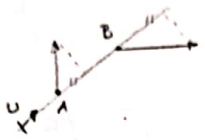
- CAMPO DE VELOCIDADES $\boxed{\vec{V_B} = \vec{V_A} + \vec{\omega} \wedge \vec{AB}}$

- MOMENTOS $\boxed{\vec{M_B} = \vec{M_A} + \vec{R} \wedge \vec{AB}}$

a)

$\boxed{V_A = V_B}$

b)

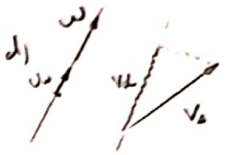


$\boxed{V_A \, U_{AB} = V_B \, U_{AB}}$

c)

$\boxed{I = \vec{V_A} \cdot \vec{\omega} = \vec{V_B} \, \vec{\omega} = ktte}$

d)



$\boxed{\vec{V_d} = \vec{V_A} \cdot \vec{U_\omega} = \dfrac{\vec{V_A} \, \vec{\omega}}{|\vec{\omega}|}}$

- EIRD

$\vec{V_I} = \vec{V_d}$

$V_d \,//\, \omega$

EIRD → V_d

$\boxed{\Delta I = \dfrac{\omega \wedge V_A}{|\omega|^2} + \lambda \vec{\omega}}$

- MOVIMIENTO RELATIVO PUNTUAL

- $\boxed{\vec{V_A} = \vec{V_{A\,a/1}} + \vec{V_{A\,v/1}}}$

$\boxed{\vec{V_{A\,a/1}} = \vec{V_0} + \vec{\omega_1} \wedge \vec{OA}}$

$\boxed{V_{A\,v/1} = \dfrac{d\,OA}{dt}\Big|_M}$

- $\boxed{a_A = a_{A\,a/1} + a_{A\,v/1} + a_{A\,COR/1}}$

$\boxed{\vec{a_{A\,a/1}} = \vec{a_0} + \vec{\alpha_1} \wedge \vec{OA} + \vec{\omega_1} \wedge (\vec{\omega_1} \wedge \vec{OA})}$

$\boxed{\vec{a_{A\,v/1}} = \dfrac{d\,V_{A\,v/1}}{dt}\Big|_M}$

$\boxed{\vec{a_{A\,COR/1}} = 2\,\omega \wedge V_{A\,v/1}}$

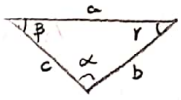
- MOVIMIENTO RELATIVO ENTRE DOS SOLIDOS:

$$\omega_{2\,r/1} = \omega_2 - \omega_1 \qquad \omega_2 = \omega_{2\,a/1} + \omega_{2\,r/1}$$

· OBTENCIÓN DE ω:

- METODO GRAFICO: TMA SENO $\quad \frac{a}{\sin\alpha} = \frac{b}{\sin\beta} = \frac{c}{\sin\gamma}$

TMA COSENO $\quad a = \sqrt{c^2 + b^2 - 2cb\cos\alpha}$



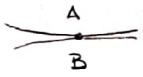
- METODO MATEMATICO: << RESAL // CAMPO DE ACELERACIONES >>

$$\vec{a}_{B\,r/1} = \vec{a}_{A\,r/1} + \vec{\alpha}_{2\,r/1} \wedge \vec{AB} + \vec{\omega}_{2\,r/1} \wedge (\vec{\omega}_{2\,r/1} \wedge \vec{AB})$$

$$\vec{\alpha}_{2\,r/1} = \vec{\alpha}_2 - \vec{\alpha}_1 - \vec{\omega}_1 \wedge \vec{\omega}_2$$

↑ RESAL

° SOLIDOS EN CONTACTO



$$\vec{V}_{B\,r/1} = \vec{V}_B - \vec{V}_A = \vec{V}_{rel}$$

$$\omega_{2\,r/1} = \omega_2 - \omega_1 = \omega_{rel}$$

CASO 1 | $V_{rel} \neq 0$, $\omega_{rel} = 0$

CASO 2 | $V_{rel} = 0$ | - $\omega_{rod} = 0 \wedge \omega_{piv} \neq 0$ (PIVOTAJE)

- $\omega_{rod} \neq 0 \wedge \omega_{piv} = 0$ (RODADURA)

- BOULE: (DERIVACIÓN EN BASES MOVILES)

$$\alpha_1 = \left.\frac{d\omega_1}{dt}\right|_F = \left.\frac{d\omega_1}{dt}\right|_m + \vec{\omega}_{sm} \wedge \vec{\omega}_1$$

TEMA 10: CINEMATICA DEL MOVIMIENTO PLANO

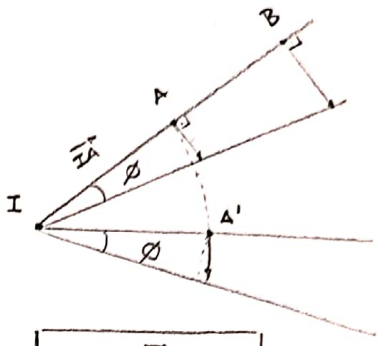
- CIR:

$$\overrightarrow{AI} = \frac{\vec{\omega} \wedge \vec{V_A}}{\omega^2}$$

$$\vec{V}_I = \vec{0}$$

$$V_A \perp IA$$

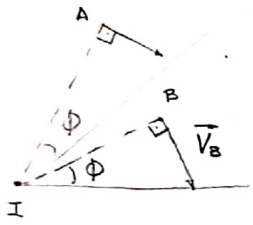
$$V_A \perp \omega$$



$$|\vec{V_A}| = |\vec{V_{A'}}|$$

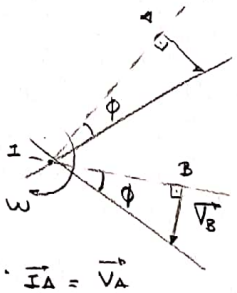
$$tg\,\phi = \frac{\vec{V_A}}{\overrightarrow{IA}} = \omega$$

1) $\vec{V_A}$ ∩ DIR. V_B → $\vec{V_B}$? 2) $\vec{V_A}$ ∩ ω → $\vec{V_B}$? 3) $\vec{V_A} = \vec{V_B}$ 4) $\vec{V_A} \parallel \vec{V_B}$



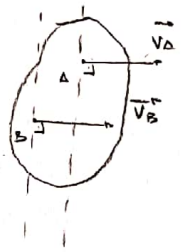
- $IA \Rightarrow \omega = \frac{V_A}{\overline{IA}}$
- $IB \Rightarrow V_B = \omega \overrightarrow{IB} = \frac{V_A}{\overline{IA}} \overrightarrow{IB}$

$$\vec{V_B} = \frac{V_A}{\overline{IA}} \overrightarrow{IB}$$

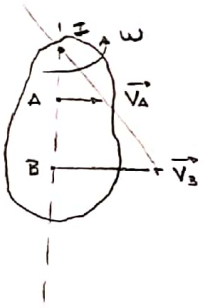


- $\overrightarrow{IA} = \frac{\vec{V_A}}{\omega}$
- $\overrightarrow{IB} \Rightarrow \vec{V_B} = \omega \overrightarrow{IB}$

$$\vec{V_B} = \omega \overrightarrow{IB}$$



- $I = \infty$



$$\omega = \frac{V_A}{\overline{IA}} = \frac{V_B}{\overline{IB}}$$

- VELOCIDAD DE SUCESIÓN:

$$V_S = \frac{\omega_r}{\frac{1}{R_b} - \frac{1}{R_r}}$$

SI BASE ω_b → $\omega_{R\,r/B}$

$$\frac{d\overrightarrow{OI}}{dt} = \vec{V_S}$$

- ACELERACION CIR:

$$\vec{a_I} = \vec{V_S} \wedge \vec{\omega}$$

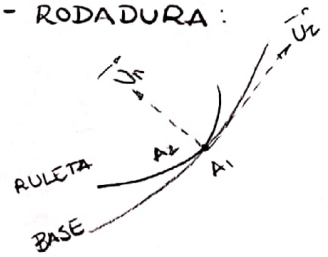
- POLO DE ACELERACIONES: $\vec{a_C} = \vec{0}$ →

$$\frac{a_A}{\overline{CA}} = \sqrt{\alpha^2 + \omega^4} \quad (CTE)$$

$$\vec{a_C} = \vec{a_A} + \vec{\alpha} \wedge \overrightarrow{AC} - \omega^2 \cdot \overrightarrow{AC}$$

$$tg\,\varphi = \frac{\alpha}{\omega^2} \quad (CTE)$$

- RODADURA:



- $V_{A_2 r/1} = 0 \quad V_{A_2} = V_{A_1}$
- $a_{tg_{A_1}} = a_{tg_{A_2}}$