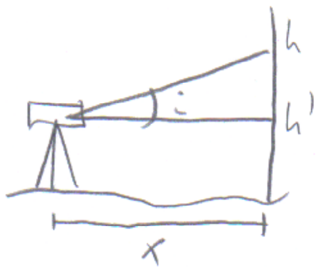
PREGUNTA 1 AUXILIAR 1

PRIMAVERA 2007

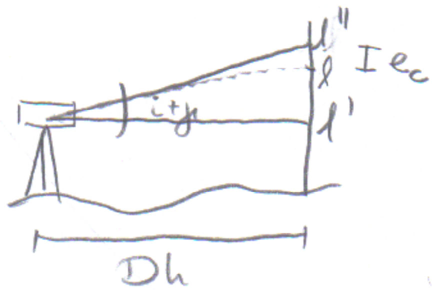
. Mira cercana



$$\frac{h-h'}{x} = tg(i)$$

$$\Rightarrow h' = h - x\,tg(i)$$

. Mira lejana



$$e_c = 0{,}42\,\frac{Dh^2}{R_T}$$

$$l'' = l + e_c$$

$$tg(i+\mu) = \frac{l''-l'}{Dh} \Rightarrow l' = l'' - Dh \cdot tg(i+\mu)$$
$$= l + e_c - Dh\,tg(i+\mu)$$

_ Cálculo de μ

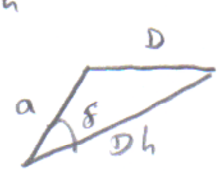
. Se tiene que para n graduaciones:

$$\mu = n\alpha = \frac{n\Delta}{R} \quad (\text{es decir, para } \measuredangle = 200 \text{ grad})$$

. Para un ángulo intermedio, interpolando linealmente:

$$\mu = \frac{n \cdot \Delta}{R} \cdot \frac{\measuredangle}{\pi}$$

_ Cálculo de Dh



Teorema del coseno:

$$D^2 = a^2 + Dh^2 - 2 \cdot a \cdot D_h \cdot \cos\delta$$

$$\Rightarrow Dh^2 - 2aDh \cdot \cos\delta + (a^2 - D^2) = 0$$

$$\Rightarrow Dh = \frac{2a\cos\delta \pm \sqrt{4a^2\cos^2\delta - 4(a^2-D^2)}}{2} = a\cos\delta \pm \sqrt{a^2(\cos^2\delta - 1) + D^2}$$

- Desniveles:

$$dn_{12} = h_1' - l_2' = h_1 - A\, tg(i) - \left[L_2 + 0{,}42 \frac{Dh_A^2}{R_T} - Dh_A\, tg\left(i + \frac{m\Delta}{R} \cdot \frac{\alpha}{\pi}\right) \right]$$

donde: $Dh_A = A \cos\alpha \pm \sqrt{A^2(\cos^2\alpha - 1) + D^2}$

$$dn_{21} = -dn_{12} = h_2' - l_1' = h_2 - B\, tg(i) - \left[L_1 + 0{,}42 \frac{Dh_B^2}{R_T} - Dh_B\, tg\left(i + \frac{m\Delta}{R} \cdot \frac{\beta}{\pi}\right) \right]$$

donde: $Dh_B = B \cos\beta \pm \sqrt{B^2(\cos^2\alpha - 1) + D^2}$

Luego, igualando desniveles y considerando $tg(\alpha) \approx \alpha$

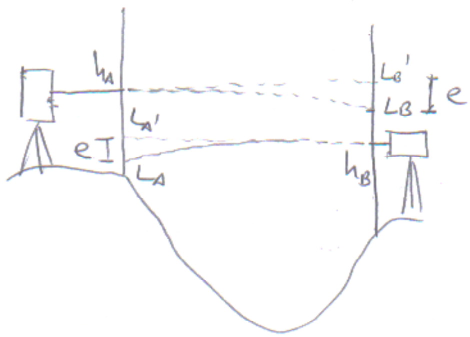
$$\Rightarrow h_1 - A \cdot i - L_2 - 0{,}42 \frac{Dh_A^2}{R_T} + Dh_A \cdot \left(i + \frac{m\Delta}{R} \cdot \frac{\alpha}{\pi}\right) = L_1 + 0{,}42 \frac{Dh_B^2}{R_T} - Dh_B \left(i + \frac{m\Delta}{R} \cdot \frac{\beta}{\pi}\right) - h_2 + B \cdot i$$

$$\Rightarrow i \left[Dh_A - A - B + Dh_B \right] = L_1 + L_2 + \frac{0{,}42}{R_T} \left[Dh_A^2 + Dh_B^2 \right] - \frac{m\Delta}{R\pi} \left[\alpha \cdot Dh_A + \beta Dh_B \right] - h_1 - h_2$$

$$\Rightarrow i = \frac{(L_1 + L_2) - (h_1 + h_2) + \frac{0{,}42}{R_T} \left[Dh_A^2 + Dh_B^2 \right] - \frac{m\Delta}{\pi \cdot R} \left[\alpha Dh_A + \beta Dh_B \right]}{Dh_A + Dh_B - (A + B)}$$

PREGUNTA 3 AUXILIAR 1
PRIMAVERA 2007

- CRUCE VALLE $\overline{AB}$



$$dm_{AB} = h_A - L_B' = h_A - (L_B + e)$$
$$dm_{BA} = -dm_{AB} = h_B - L_A' = h_B - (L_A + e)$$

$$\Rightarrow 2\,dm_{AB} = h_A - h_B - (L_B + \cancel{e} - L_A - \cancel{e})$$

$$\Rightarrow dm_{AB} = \frac{h_A - h_B - (L_B - L_A)}{2} = -19\,m$$

$$C_B = C_A + dm_{AB} = 42 - 19 = 23\,m$$

- DESNIVEL TAQUIMÉTRICO $\overline{BC}$

$$dm_{BC} = h_i - h_j + \frac{1}{2} \cdot k \cdot G \cdot \text{sen}(2 \cdot \alpha)$$

$$\Rightarrow dm_{BC} = -7\,m \qquad C_C = C_B + dm_{BC} = 16\,m$$

- DESNIVEL CD

CAÍDA LIBRE: $x = \cancel{x_0}^{0} + \cancel{v_0}^{0} t + \frac{1}{2} g \cdot t^2$

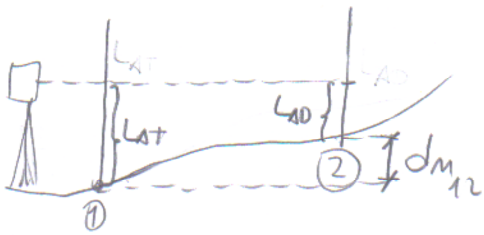
$$t_{caida} = 0{,}452\,s \Rightarrow x = 1\,m \Rightarrow dm_{CD} = -1\,m$$

$$C_D = C_C + dm_{CD} = 15\,m$$

- TRAMO $\overline{DE}$

– PRIMERO, DEDUCCIÓN DESNIVELES:

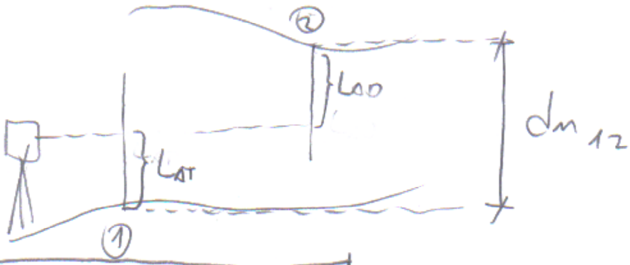
CASO 1



$$dm_{12} + L_{AD} = L_{AT}$$

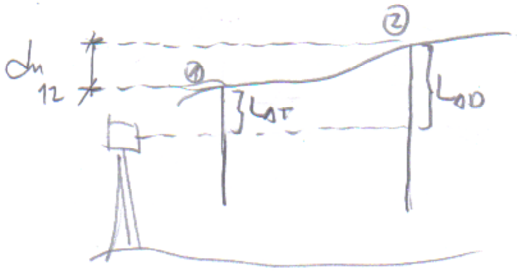
$$\Rightarrow \boxed{dm_{12} = L_{AT} - L_{AD}}$$

CASO 2



$$\Rightarrow \boxed{dn_{12} = L_{AT} + L_{AD}}$$

CASO 3



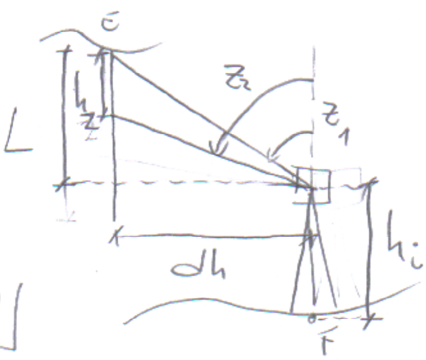
$$dn_{12} + L_{AT} = L_{AD} \Rightarrow \boxed{dn_{12} = L_{AD} - L_{AT}}$$

* DEDUCCIÓN REALIZADA PARA DESNIVEL POSITIVO. PARA DESNIVEL NEGATIVO, LAS FÓRMULAS SON VÁLIDAS. EL SIGNO SERÁ ENTREGADO AL REEMPLAZAR VALORES

AHORA:

$$\left.\begin{aligned} dn_{D-PC1} &= L_{AT} + L_{AD} = 2{,}31\ m \\ dn_{PC1-PC2} &= L_{AD} - L_{AT} = -3{,}08\ m \\ dn_{PC2-PC3} &= L_{AD} - L_{AT} = -3{,}12\ m \\ dn_{PC3-E} &= L_{AD} - L_{AT} = -3{,}11\ m \end{aligned}\right\} \Rightarrow \begin{aligned} dn_{D-E} &= -7\ m \\ C_E = C_D + dn_{DE} &= 8\ m \end{aligned}$$

- TRAMO EF



$\boxed{h_1 = 0}$

$$tg\, z_1 = \frac{dh}{L} \Rightarrow dh = L \cdot tg\, z_1$$

$$tg\, z_2 = \frac{dh}{L - h_2}$$

$$\Rightarrow tg\, z_2 (L - h_2) = L \cdot tg\, z_1$$

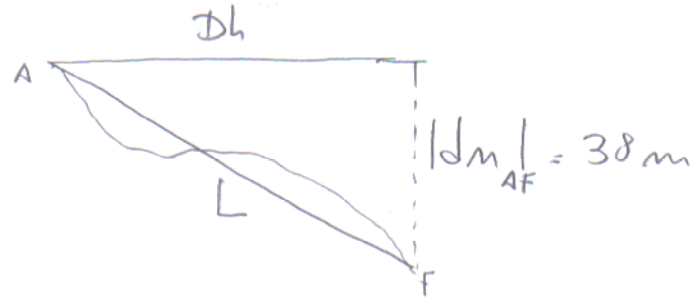
$$\Rightarrow L = \frac{h_2 \cdot tg\, z_2}{tg\, z_2 - tg\, z_1}$$

LUEGO, $dn_{EF} = -(L + h_i)$

$\Rightarrow dn_{EF} = -\left[h_i + \dfrac{h_2 \cdot tg z_2}{tg z_2 - tg z_1}\right]$

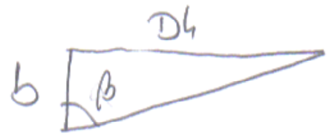
$\Rightarrow dn_{EF} = -4 m$ $C_F = C_E + dn_{EF} = 4 m$

. FINALMENTE:



$L = L_0 (1 + \alpha \cdot \Delta T)$

PARA ENCONTRAR Dh, SE UTILIZA TELÉMETRO



$tg\beta = \dfrac{Dh}{b} = \dfrac{Dh}{b_0 (1 + \alpha \cdot \Delta T)} \Rightarrow Dh = tg\beta \cdot b_0 \cdot (1 + \alpha \cdot \Delta T)$

SISTEMA COHERENTE: TRIÁNGULO RECTÁNGULO

$\Rightarrow Dh^2 + dn^2 = L^2$

$\Rightarrow tg^2\beta \cdot b_0^2 (1 + \alpha \cdot \Delta T)^2 + dn^2 = L_0^2 (1 + \alpha \cdot \Delta T)^2$

$\Rightarrow (1 + \alpha \Delta T)^2 = \dfrac{dn^2}{L_0^2 - tg^2\beta \cdot b_0^2}$

$\Rightarrow 1 + \alpha \Delta T = \dfrac{dn}{\sqrt{L_0^2 - tg^2\beta \cdot b_0^2}} \Rightarrow \Delta T = \dfrac{1}{\alpha}\left[\dfrac{dn}{\sqrt{L_0^2 - tg^2\beta \cdot b_0^2}} - 1\right]$

REEMPLAZANDO:

$\Delta T = 4{,}45°$

$\Delta T = T_m - T_0 \Rightarrow T_m = T_0 + \Delta T \Rightarrow T_m = 10{,}8°$