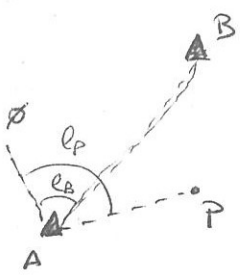
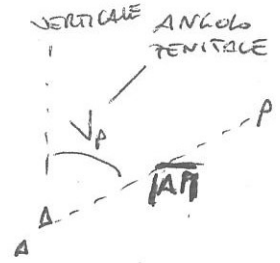
IRRADIAMENTO (o IRRAGGIAMENTO)



(X_A, Y_A), (X_B, Y_B) noti — $(X_P, Y_A) = ?$

ℓ_B, ℓ_r, $|\overline{AP}|_0$ misure

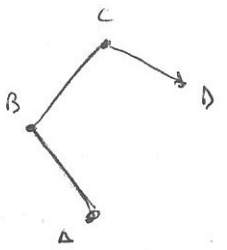


$$|\overline{AP}|_0 = |\overline{AP}| \sin \nu_P$$

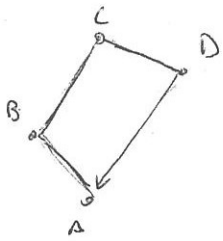
$$B\hat{A}P = \ell_P - \ell_B \Rightarrow (AB) = t_g^{-1}\left(\frac{X_B - X_A}{Y_B - Y_A}\right)$$

$$(AP) = (AB) + B\hat{A}P$$

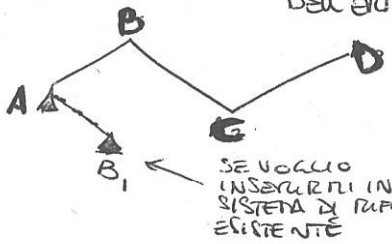
$$\begin{cases} X_P = X_A + |\overline{AP}|_0 \cdot \operatorname{sen}(AP) \\ Y_P = Y_A + |\overline{AP}|_0 \cdot \cos(AP) \end{cases}$$



POLIGONALE APERTA → PROPAGAZIONE DELL'ERRORE



POLIGONALE CHIUSA → PROPAGAZIONE DELL'ERRORE → COMPENSAZIONE



SE VOGLIO INSERIRLI IN UN SISTEMA DI RIFERIMENTO ESISTENTE

$$\begin{cases} X_B = X_A + |\overline{AB}|_0 \cdot \operatorname{sen}(AB) \\ Y_B = Y_A + |\overline{AB}|_0 \cdot \cos(AB) \end{cases}$$

LEGGE DI PROPAGAZIONE ASTUTA

$$(AB) = (BA) + (B_1\hat{A}B) \pm 200\,\text{gon}$$

POLIGONALE CHIUSA → VERIFICA CHIUSURA ANGOLARE:

$$\sum \alpha_i - (n-2)\cdot\pi \longrightarrow = 0 \text{ (IN UN MONDO IDEALE)}$$

$$= \varepsilon_\alpha \text{ (ERRORE DI CHIUSURA ANGOLARE)} \quad \varepsilon_\alpha < T_\alpha$$

$\mu_\alpha \Rightarrow$ ERRORE UNITARIO ANGOLARE

$$\alpha' = \alpha_i - \frac{\varepsilon_\alpha}{n}$$

$$(A\hat{B}C)' = (A\hat{B}C) - \mu_\alpha$$

$$(BE) = (AB) + (A\hat{B}C)' \pm 200\,\text{gon}$$

→ VERIFICA CHIUSURA LINEARE:

$$\begin{cases} X_B = X_A + |\overline{AB}|_0 \cdot \operatorname{sen}(AB) \\ Y_B = Y_A + |\overline{AB}|_0 \cdot \cos(AB) \end{cases}$$

$$\vdots$$

$$\begin{cases} X_A = X_D + |\overline{AD}|_0 \cdot \operatorname{sen}(DA) \\ Y_A = Y_D + |\overline{AD}|_0 \cdot \cos(DA) \end{cases} \quad \begin{matrix} X_A - X_A' = \varepsilon_x \\ Y_A - Y_A' = \varepsilon_y \end{matrix}$$

$T_e > \varepsilon_L$

$$\varepsilon_L = \sqrt{\varepsilon_x^2 + \varepsilon_y^2} \left| \begin{matrix} \text{ERRORE DI} \\ \text{CHIUSURA} \\ \text{LINEARE} \end{matrix} \right| < \text{tol}$$

ERRORE UNITARIO IN X $= \mu_x = \frac{\varepsilon_x}{n}$ e $\mu_y = \frac{\varepsilon_y}{n-1}$ → DISTRIBUZIONE OMOGENEA (per unità di lato)

$\mu_x = \frac{\varepsilon_x}{L}$ → LUNGHEZZA TOTALE POLIGONALE $\quad \mu_y = \frac{\varepsilon_y}{L - |\overline{AB}|_0}$ → DISTRIBUZIONE PROPORZIONALE

SI COMPENSA IN DUE MODI

$X'_{B_0} = X_{B_0} + \mu_x \cdot |\overline{AB}|_0$ → COMPENSAZIONE SU COORDINATE TOTALI

$x_B = |\overline{AB}|_0 \cdot \sin(AB)$ → COORDINATA PARZIALE

$X'_C = X_C - \mu_x (|\overline{BC}|_0 + |\overline{AB}|_0)$ .....

$X'_A = X_D - \mu_x (L) \equiv X_A$ → VERIFICA

POLIGONALE CHIUSA → COORDINATE PARZIALI

[PRIMA PARTE IDENTICA]

$$\begin{cases} X_B = |\overline{AB}|_0 \cdot \sin(AB) \\ Y_B = |\overline{AB}|_0 \cdot \cos(AB) \end{cases}$$

.....

$$\begin{cases} X_A = |\overline{DA}|_0 \cdot \sin(DA) \\ Y_A = |\overline{DA}|_0 \cdot \cos(DA) \end{cases}$$

$$\begin{cases} \varepsilon_x = \sum x_i \\ \varepsilon_y = \sum y_i \end{cases} \quad \varepsilon_L = \sqrt{\varepsilon_x^2 + \varepsilon_y^2} < T_L$$

$\mu_x = \frac{\varepsilon_x}{L}$

$\mu_y = \frac{\varepsilon_y}{L - |\overline{AB}|_0}$

$$\begin{cases} X'_{B_0} = X_B - \mu_x \cdot |\overline{AB}|_0 \\ Y'_B = Y_B - \mu_y \cdot |\overline{AB}|_0 \end{cases}$$

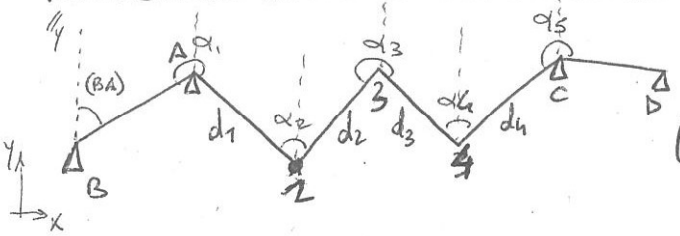
In generale → $\begin{cases} X'_{i_0} = X_i + \mu_x \cdot l_i \\ Y'_i = Y_i - \mu_y \cdot l_i \end{cases}$

$$\begin{cases} X_B = X_A + X'_B \\ Y_B = Y_A + Y'_B \end{cases}$$

....

$$\begin{cases} X_D = X_C + X'_D \\ Y_D = Y_C + Y'_D \end{cases}$$

POLIGONALE APERTA CONTROLLATA



$A_1 B_1 C_1 D$ COORD. NOTE

$$(BA) = tg^{-1}\frac{(X_A - X_B)}{(Y_A - Y_B)} + k\pi$$

$(A1) = (BA) + \alpha_1 \pm 200\,gon$

~~$(12) = (A1) + \alpha_2 \pm 200\,gon$~~

$(23) = (A1) + \alpha_2 \pm 200\,gon$

$(34) = (23) + \alpha_3 \pm 200\,gon$

$(4C) = (34) + \alpha_4 \pm 200\,gon$

$(CD)' = (4C) + \alpha_5 \pm 200\,gon \rightarrow (CD)' - (CD) = \varepsilon_\alpha \angle T_\alpha \rightarrow \mu_\alpha = \frac{\varepsilon_\alpha}{n}$

$\hat{(A2)} = (A2) - \mu_\alpha$

$\hat{(23)} = (23) - 2\mu_\alpha$

$\hat{(34)} = (34) - 3\mu_\alpha$

$\hat{(4C)} = (4C) - 4\mu_\alpha$

$\alpha_i = \alpha_i - \mu_\alpha$ { SE COMPENSO IL SINGOLO ANGOLO AZIMUTALE MISURATO

$\hat{(A2)} = (BA) + \hat{\alpha}_1 \pm 200\,gon$

$\hat{(23)} = \hat{(A2)} + \hat{\alpha}_2 \pm 200\,gon$

$\hat{(34)} = \hat{(23)} + \hat{\alpha}_3 \pm 200\,gon$

$\hat{(4C)} = \hat{(34)} + \hat{\alpha}_4 \pm 200\,gon$

METODO ALTERNATIVO

$$\begin{cases} X_2 = X_A + |\overline{A2}|_0 \cdot \sin(\hat{A2}) \\ Y_2 = Y_A + |\overline{A2}|_0 \cdot \cos(\hat{A2}) \end{cases}$$

.....

$$\begin{cases} X_C' = X_4 + |\overline{4C}|_0 \cdot \sin(\hat{4C}) \\ Y_C' = Y_4 + |\overline{4C}|_0 \cdot \cos(\hat{4C}) \end{cases} \rightarrow \begin{cases} X_C' - X_C = \varepsilon_X \\ Y_C' - Y_C = \varepsilon_Y \end{cases} \quad \varepsilon_L = \sqrt{\varepsilon_X^2 + \varepsilon_Y^2} \angle T_L \begin{cases} \mu_X = \frac{\varepsilon_X}{L} \\ \mu_Y = \frac{\varepsilon_Y}{L} \end{cases}$$

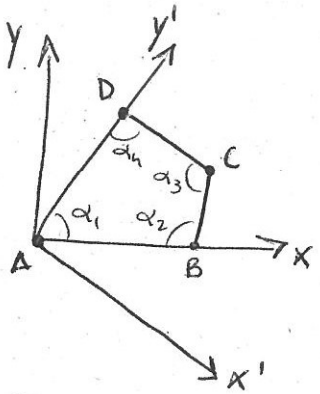
$$\begin{cases} \hat{X}_2 = X_2 - \mu_X \cdot |\overline{A2}|_0 \\ \hat{Y}_2 = Y_2 - \mu_Y \cdot |\overline{A2}|_0 \end{cases}$$

$$\begin{cases} \hat{X}_3 = X_3 - \mu_X (|\overline{A2}|_0 + |\overline{23}|_0) \\ \hat{Y}_3 = Y_3 - \mu_Y (|\overline{A2}|_0 + |\overline{23}|_0) \end{cases}$$

.....

$$\begin{cases} \hat{X}_C \equiv X_C \\ \hat{Y}_C \equiv Y_C \end{cases}$$

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$XY \rightarrow (AB) = 100\,\text{gon}$

$X'Y' \rightarrow (AB) = \alpha_1$

$\left| \begin{array}{l} X_A = \emptyset \\ Y_A = \emptyset \end{array} \right.$ $\boxed{X'Y'}$ $X_D = \emptyset$ $\boxed{XY}$ $Y_B = \emptyset$

La compensazione angolare non cambia e secondo di quale sistema di riferimento scelgo. Invece cambia la compensazione lineare.

$\left| \begin{array}{l} \varepsilon_x \\ \varepsilon_y \end{array} \right. \Rightarrow$

$\boxed{X'Y'}$

$u_x = \dfrac{\varepsilon_x}{L - |\overline{AB}|}$

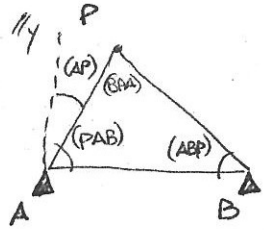
$u_y = \dfrac{\varepsilon_y}{L}$

$\boxed{XY}$

$u_x = \dfrac{\varepsilon_x}{L}$

$u_y = \dfrac{\varepsilon_y}{L - |\overline{AB}|}$

INTERSEZIONE IN AVANTI



(X_A, Y_A)
(X_B, Y_B) | NOTI
$(X_P, Y_P) = ?$

$(BPA) = 200\,\text{g} - (PAB) - (ABP)$

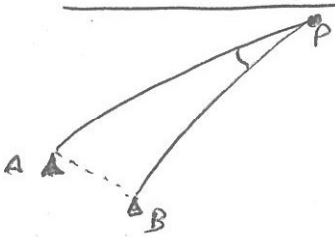
$\dfrac{|\overline{AB}|_0}{\sin(BPA)} = \dfrac{|\overline{AP}|_0}{\sin(ABP)} \Rightarrow |\overline{AP}|_0 = \dfrac{\sin(ABP)}{\sin(BPA)} \cdot |\overline{AB}|_0$

$(AP) = (AB) - (PAB) \rightarrow \left| \begin{array}{l} X_P = X_A + |\overline{AP}|_0 \cdot \sin(AP) \\ Y_P = Y_A + |\overline{AP}|_0 \cdot \cos(AP) \end{array} \right.$

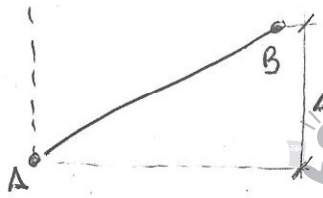
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TRIANGOLAZIONE → Utilizzata per mappare il territorio nazionale

La precisione cala drasticamente nel momento in cui andiamo a restringere lo specchio di apertura (punto da collimare troppo lontano)



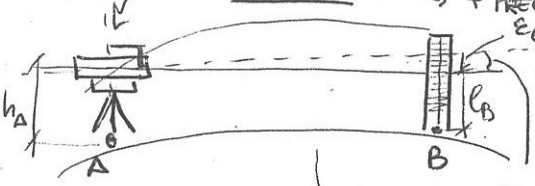
LIVELLAZIONE



$$\Delta z_{AB} = z_B - z_A$$

DUE TIPI DI LIVELLAZIONE

- GEOMETRICA
  - (MISURE ORIZZONTALI) TRAMITE IL LIVELLO
    - LIVELLO DA ESTERNO
    - → + PRECISO
  - TRAMITE STAZIONE TOTALE
- TRIGONOMETRICA



$$\Delta_{AB} = h_A - l_B - \varepsilon_{l_V} - \varepsilon_{l_C} - \varepsilon_{l_R}$$

ERRORE DI VERTICALITÀ = ε_V

ERRORE DI CURVATURA TERRESTRE = ε_{l_C}

ERRORE DI RIFRAZIONE ATMOSFERICA = ε_{l_R}

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