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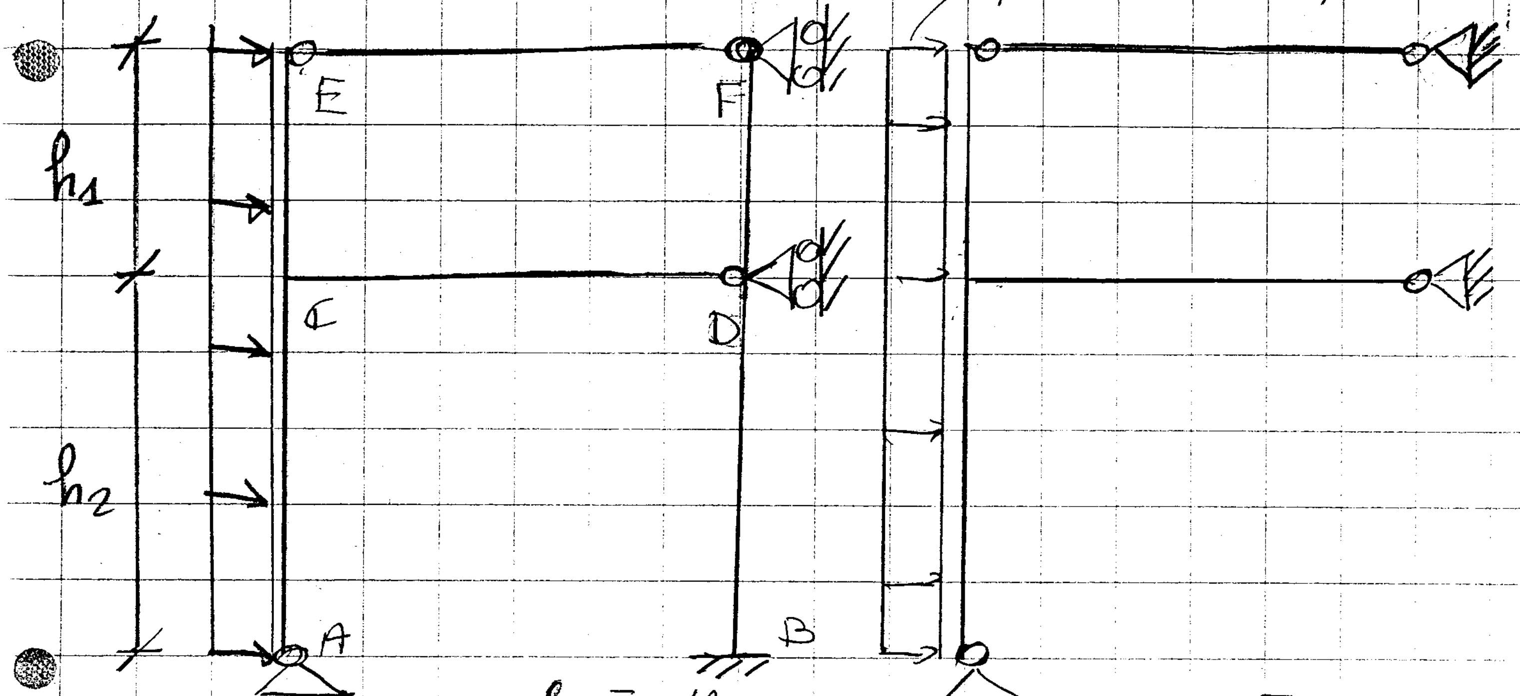
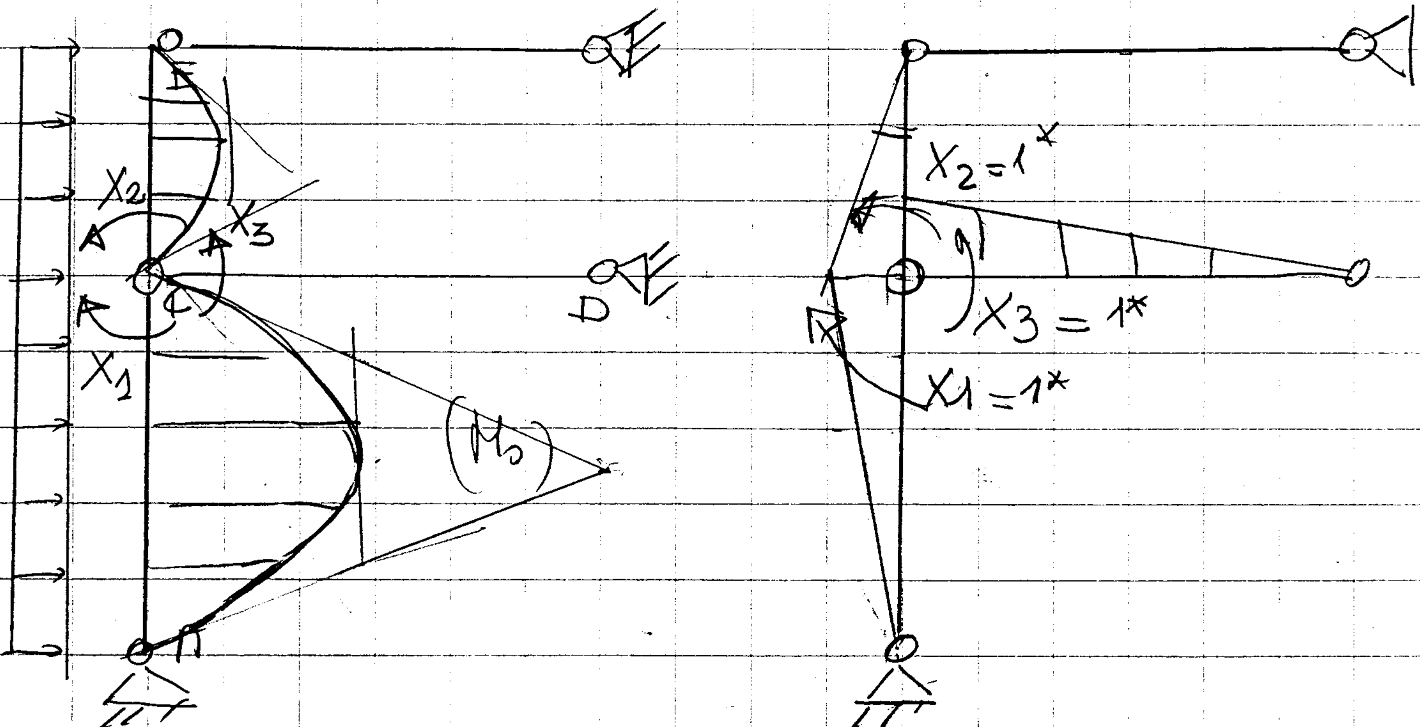


Fig. 1A — Fig 1B

A_1) La presenza dei vincoli in F e D rende la struttura (x spostamenti del assiali) a nodi fissi ed è immediato constatare come il pilastro FB sia, al più, soggetto a sforzo normale; è possibile quindi ricondursi allo schema di Fig 1.B.

<u>Metodo delle Forze</u>



Eq. $\boxed{X_1 = X_2 + X_3}$

Eq. di congruenza

$$\begin{cases} \varphi_{CE} - \varphi_{CA} = 0 \\ \varphi_{CD} - \varphi_{CA} = 0 \end{cases}$$

$$\begin{cases} \varphi_{CA} = -\dfrac{X_1 h_2}{3EJ} + \dfrac{q h_2^3}{24EJ} \\ \varphi_{CE} = \dfrac{X_2 h_1}{3EJ} - \dfrac{q h_1^3}{24EJ} \\ \varphi_{CD} = \dfrac{X_3 l}{3EJ} \end{cases}$$

Posto $X_1 = X_2 + X_3$

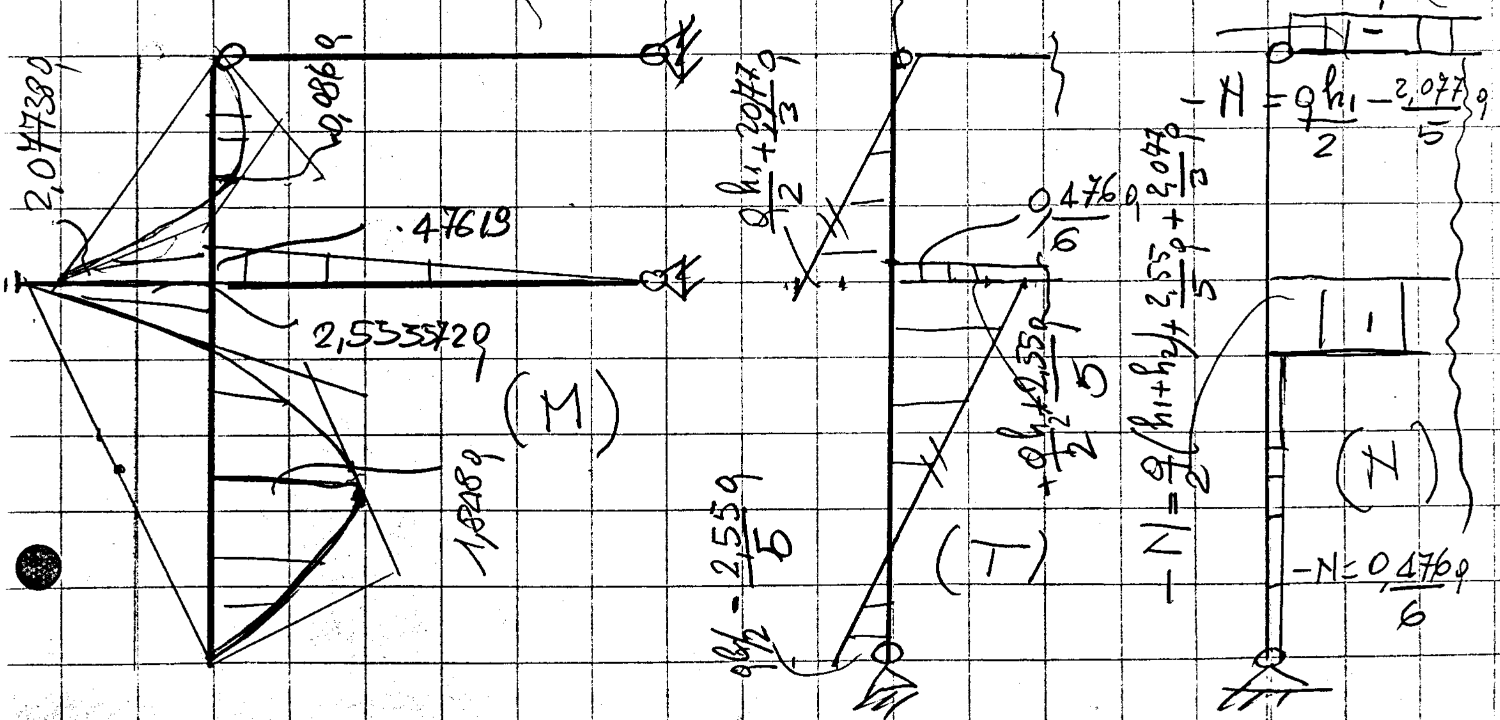
$\Downarrow$

$$\begin{cases} 0 = -\eta_{20} + X_2 \eta_{22} + X_3 \eta_{23} = -\dfrac{q}{24EJ}\left(h_1^3 + h_2^3\right) + \dfrac{X_2}{3EJ}(h_1 + h_2) + \dfrac{X_3 h_2}{3EJ} \\ 0 = -\eta_{30} + X_2 \eta_{23} + X_3 \eta_{33} = -\dfrac{q}{24EJ}\left(h_2^3\right) + \dfrac{X_2 h_2}{3EJ} + \dfrac{X_3}{3EJ}(h_2 + l) \end{cases}$$

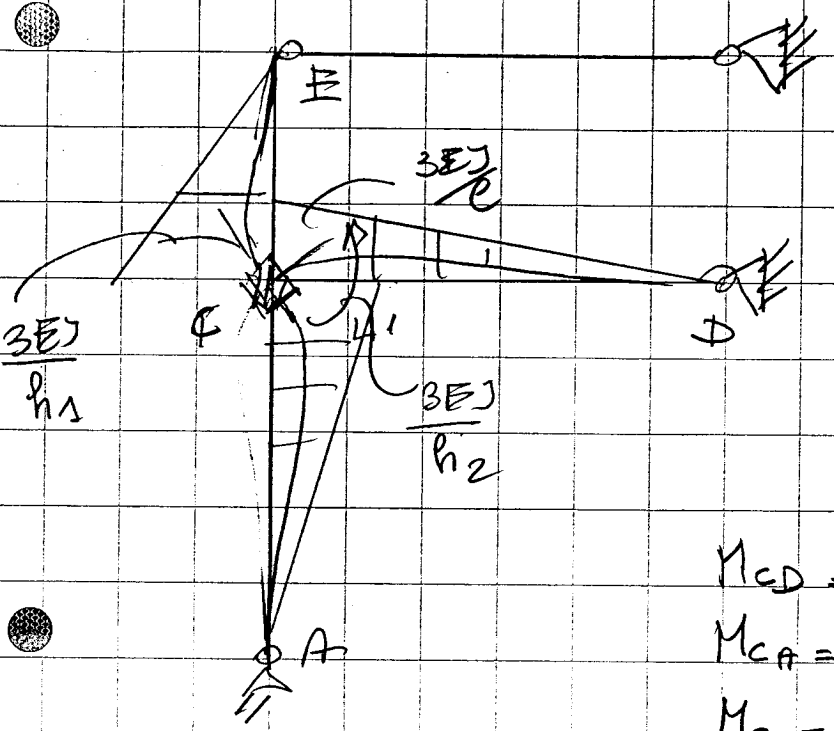
$$\frac{1}{3EJ}\begin{vmatrix} h_1+h_2 & h_2 \\ h_2 & h_2+l \end{vmatrix} \begin{vmatrix} X_2 \\ X_3 \end{vmatrix} = \frac{q}{24EJ}\begin{vmatrix} h_2^3 + h_1^3 \\ h_2^3 \end{vmatrix} \Longrightarrow$$

$$\begin{vmatrix} 8 & 5 \\ 5 & 11 \end{vmatrix} \begin{vmatrix} X_2 \\ X_3 \end{vmatrix} = \frac{q}{8EJ}\begin{vmatrix} 152 \\ 125 \end{vmatrix} \Longrightarrow \begin{array}{l} X_2 = 2,07738\, q \ (KgM) \\ X_3 = .47619\, q \ (〃) \end{array}$$

$$\Longrightarrow X_1 = 2,553572\, q \ (〃)$$



METODO DEGLI SPOSTAMENTI



$$K_{11} = 3EJ\left(\frac{1}{h_1} + \frac{1}{h_2} + \frac{1}{\ell}\right) = 2{,}1\,EJ$$

$$K_{10} = +\frac{q}{8}\left(-h_2^2 + h_1^2\right) = -2q$$

$$U_1 = \frac{-K_{10}}{K_{11}} = 0{,}95238\,\frac{q}{EJ}$$

$$M_{CD} = +U_1 \cdot \frac{3EJ}{\ell} = 0{,}47619\,q \quad (\text{Kgm})$$

$$M_{CA} = -\frac{qh_2^2}{8}\ell + \frac{3EJ}{h_2}U_1 = 2{,}55357\,q \quad (\text{Kgm})$$

$$M_{CE} = +\frac{qh_1^2}{8} + \frac{3EJ}{h_1}U_1 = 2{,}07738\,q \quad (\text{Kgm})$$