TAVOLA DEI PILASTRI

SEZIONI 1:10

30×40

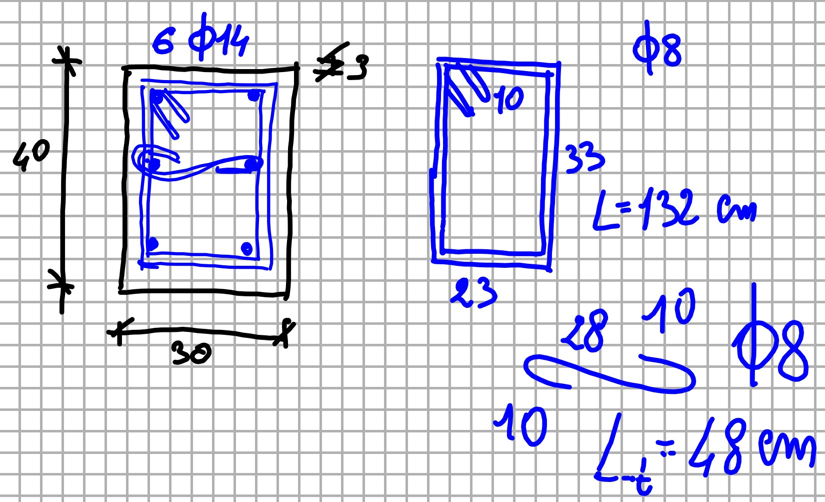


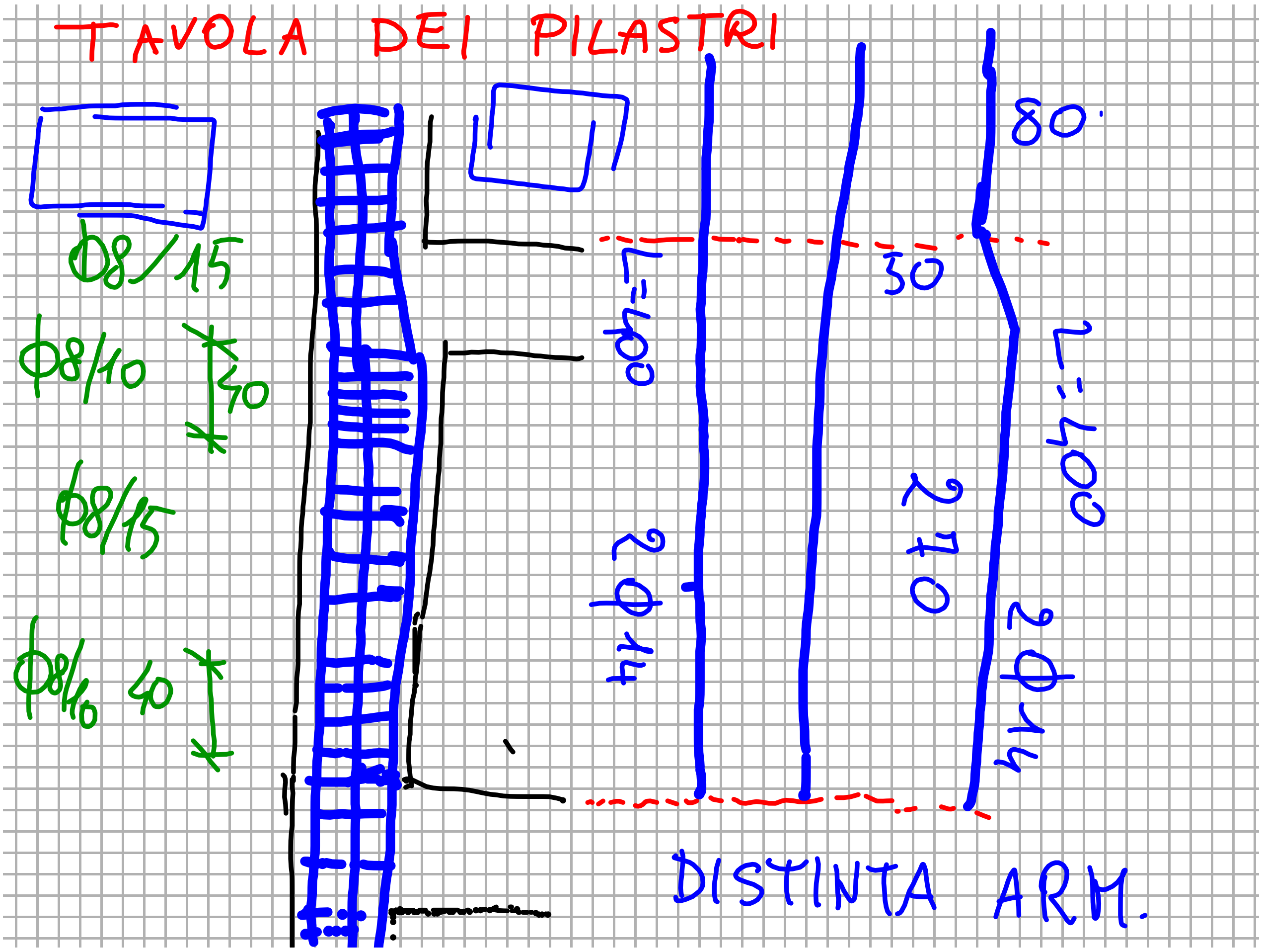
TAVOLA DEI PILASTRI

TABELLA DELLE SEZIONI

PILASTRO

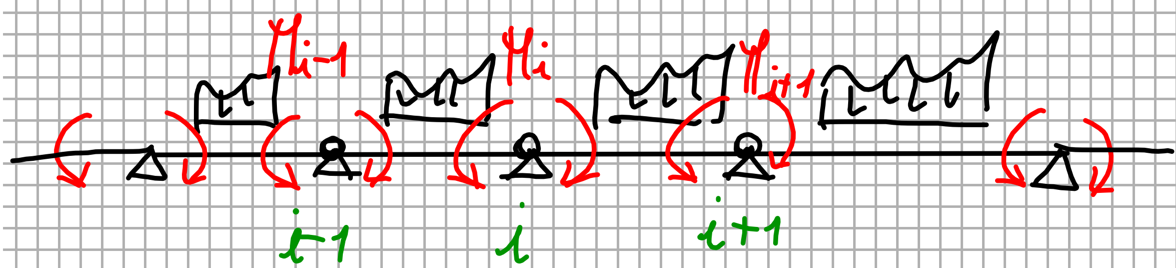
PIANO	1,5	2	3	4
7	30×30			
6	30×30			
5	30×40			
4	30×50			
3	30×50			
2	30×60			
1	30×70			

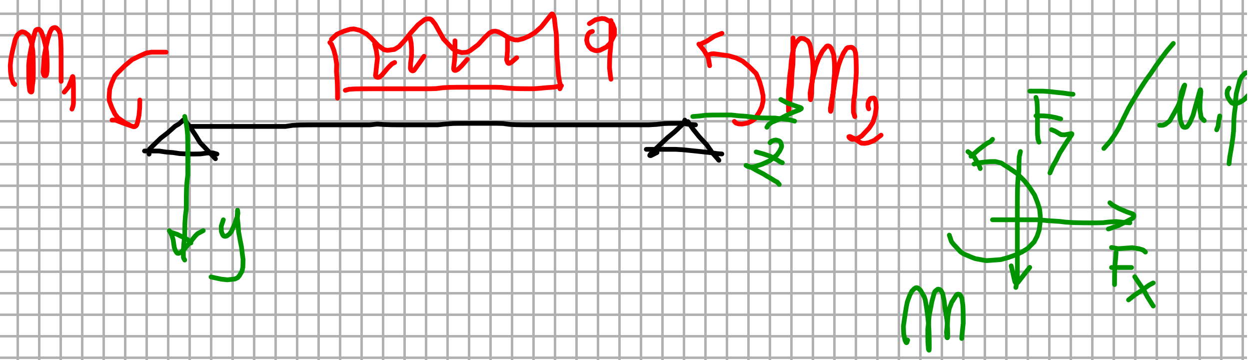
TAVOLA DEI PILASTRI

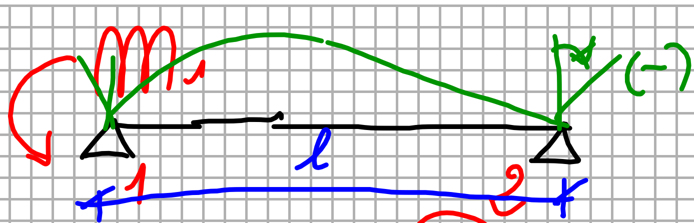


DISTINTA ARM.

TRAVE CONTINUA

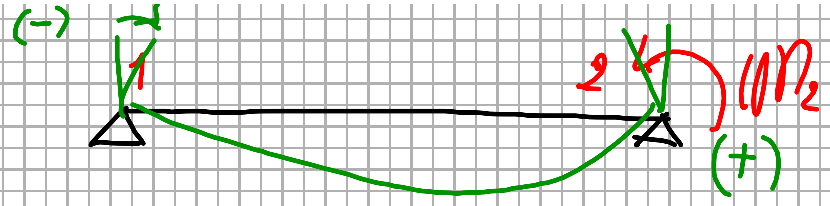






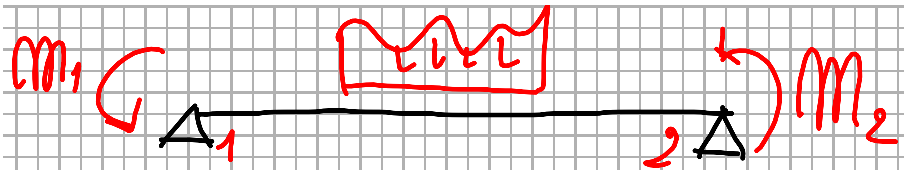
$$\varphi_1 = \frac{M_1 \ell}{3EI} = \alpha_1 M_1$$

$$\varphi_2 = -\frac{M_1 \ell}{6EI} = -\beta M_1$$



$$\varphi_1 = -\frac{M_2\, l}{6EI} \quad \beta \quad = -\beta M_2$$

$$\varphi_2 = \frac{M_2\, l}{3EI} = \alpha_2 M_2 \qquad \alpha_2$$

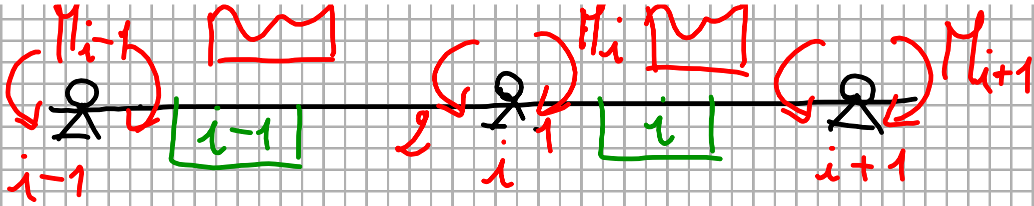


$$\varphi_1 = \alpha_1 M_1 - \beta M_2 + \varphi_{1,q}$$

$$\varphi_2 = -\beta M_1 + \alpha_2 M_2 + \varphi_{2,q}$$

$$\varphi_{1,q} = -\frac{q\, l^3}{24EI} \qquad \varphi_{2,q} = \frac{q\, l^3}{24EI}$$

Carico costante



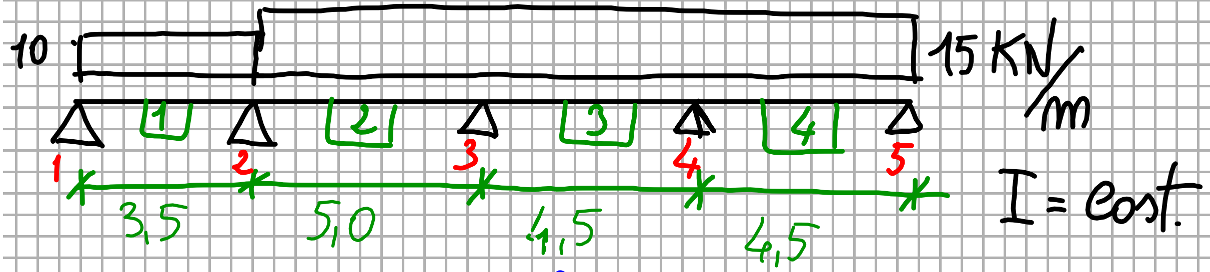
$$\varphi_2^{i-1} = \varphi_1^{i}$$

$$\varphi_2^{i-1} = +\beta^{i-1} M_{i-1} + \alpha_2^{i-1} M_i + \varphi_{2,q}^{i-1}$$

$$\varphi_1^{i} = -\alpha_1^{i} M_i - \beta M_{i+1} + \varphi_{1,q}^{i}$$

EQ. DEI TRE MOMENTI

$$\beta_{i-1} M_{i-1} + \left(\alpha_2^{i-1} + \alpha_1^{i}\right) M_i + \beta^{i} M_{i+1} = -\varphi_{2,q}^{i-1} + \varphi_{1,q}^{i}$$



	1	2	3	4
$\alpha_1=\alpha_2$	1,167	1,667	1,5	1,5
β	0,583	0,833	0,75	0,75
$\varphi_{1,q}$	−17,86	−78,13	−56,95	−56,95
$\varphi_{2,q}$	17,86	78,13	56,95	56,95

$$\cancel{0{,}583\times 0} + (1{,}167+1{,}667)M_2 + 0{,}833\,M_3 = -95{,}99$$
$$0{,}833\,M_2 + (1{,}667+1{,}5)\,M_3 + 0{,}75\,M_4 = -135{,}08$$
$$0{,}75\,M_3 + 3\,M_4 + 0 = -113{,}9$$

$$2{,}834\,M_2 + 0{,}833\,M_3 = -95{,}94$$
$$0{,}833\,M_2 + 3{,}167\,M_3 + 0{,}75\,M_4 = -135{,}08$$
$$0{,}75\,M_3 + 3\,M_4 = -113{,}9$$

$$M_2 = -33{,}86 - 0{,}294\, M_3 \qquad \boxed{M_2 = -25{,}47\, KNm}$$

$$-28{,}21 - 0{,}245\, M_3 + 3{,}167\, M_3 + 0{,}75\, M_4 = -135{,}08$$

$$2{,}922\, M_3 + 0{,}75\, M_4 = -106{,}87$$

$$M_3 = -36{,}57 - 0{,}260\, M_4 \qquad \boxed{M_3 = -28{,}55\, KNm}$$

$$-27{,}43 - 0{,}195\, M_4 + 3\, M_4 = -113{,}9$$

$$2{,}805\, M_4 = -86{,}47$$

$$\boxed{M_4 = -30{,}83\ KN\, m}$$

METODO DEGLI SPOSTAMENTI

$$\alpha_2 \varphi_1 = \alpha_1 \alpha_2 \mathcal{M}_1 - \alpha_2 \beta \mathcal{M}_2$$

$$\beta \varphi_2 = -\beta^2 \mathcal{M}_1 + \alpha_2 \beta \mathcal{M}_2$$

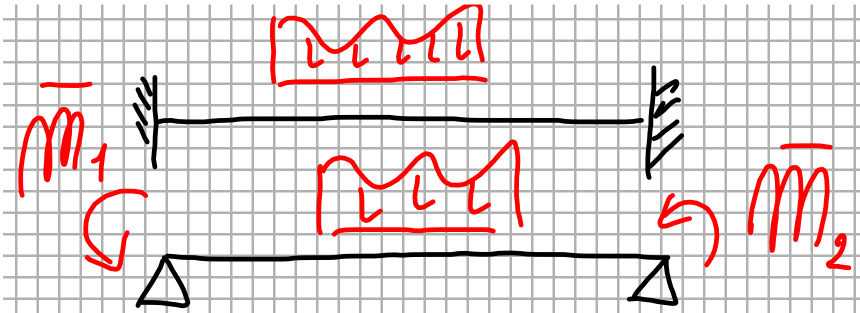
$$\alpha_2 \varphi_1 + \beta \varphi_2 = \alpha_1 \alpha_2 \mathcal{M}_1 - \beta^2 \mathcal{M}_1$$

$$m_1 = \underbrace{\frac{\alpha_2}{\alpha_1\alpha_2-\beta^2}}_{\rho_1}\varphi_1 + \underbrace{\frac{\beta}{\alpha_1\alpha_2-\beta^2}}_{\rho_{12}}\varphi_2$$

$$m_2 = \underbrace{\frac{\beta}{\alpha_1\alpha_2-\beta^2}}_{\rho_{12}}\varphi_1 + \underbrace{\frac{\alpha_1}{\alpha_1\alpha_2-\beta^2}}_{\rho_2}\varphi_2$$

$$m_1 = \rho_1\varphi_1 + \rho_{12}\varphi_2$$

$$m_2 = \rho_{12}\varphi_1 + \rho_2\varphi_2$$



$$\beta\alpha_1\bar{m}_1 - \beta^2\bar{m}_2 = -\beta\varphi_{1,q}$$

$$-\alpha_1\beta\bar{m}_1 + \alpha_1\alpha_2\bar{m}_2 = -\alpha_1\varphi_{2,q}$$

$$(\alpha_1\alpha_2 - \beta^2)\bar{m}_2 = -\beta\varphi_{1,q} - \alpha_1\varphi_{2,q}$$

$$(\alpha_1\alpha_2 - \beta^2)\bar{m}_2 = -\beta\varphi_{1,q} - \alpha_1\varphi_{2,q}$$

$$\bar{m}_2 = -\frac{\beta}{\alpha_1\alpha_2 - \beta^2}\varphi_{1,q} - \frac{\alpha_1}{\alpha_1\alpha_2 - \beta_2}\varphi_{2,q}$$

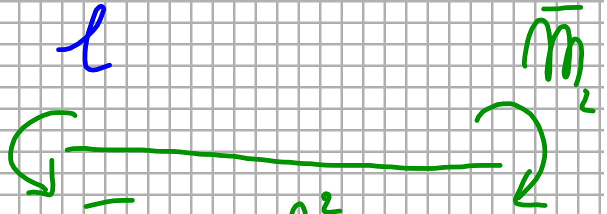
$$\bar{m}_2 = -\rho_{12}\varphi_{1,q} - \rho_2\varphi_{2,q}$$

$$\rho_2 = \frac{\frac{l}{3EI}}{\frac{l^2}{9E^2I^2} - \frac{l^2}{36E^2I^2}} = \frac{\frac{\cancel{l}}{3E\cancel{I}}}{\frac{(4-1)l^{\cancel{2}}}{36E^2I^{\cancel{2}}}}$$

$$\rho_2 = \frac{12\,EI}{3\,l} = \frac{4EI}{l}$$

$$\rho_1 = \frac{4EI}{l}$$

$$\rho_{12} = \frac{2EI}{l}$$



$$\bar{M}_1 = \frac{ql^2}{12}$$

$$\bar{M}_2 = +\frac{2\cancel{EI}}{\cancel{l}}\left(+\frac{ql^{\cancel{3}\,2}}{24\cancel{EI}}\right) - \frac{4\cancel{EI}}{\cancel{l}}\,\frac{ql^{\cancel{3}\,2}}{24\cancel{EI}}$$

$$\bar{M}_2 = -2\cdot\frac{ql^2}{2\cdot 4\cdot 12} = -\frac{ql^2}{12}$$

$$M_1 = \rho_1\,\varphi_1 + \rho_{12}\,\varphi_2 + \bar{M}_1$$

$$M_2 = \rho_{12}\,\varphi_1 + \rho_2\,\varphi_2 + \bar{M}_2$$

$$\rho_1 = \frac{4EI}{l}$$

$$\rho_2 = \rho_1 = \frac{4EI}{l}$$

$$\rho_{12} = \frac{2EI}{l}$$