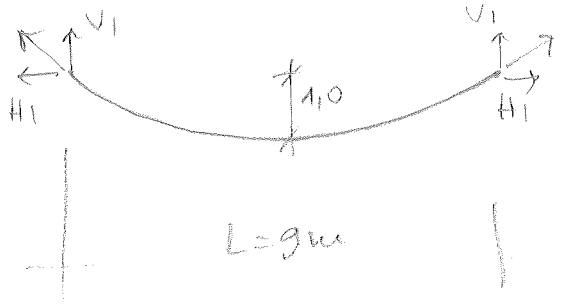
laurea Magistrale in Arch. – Univ. di Parma

Prova scritta di "Scienze delle Costruz. 2: arch. dell'equilibrio"

27/01/2016

1) Es. metodo di Mery

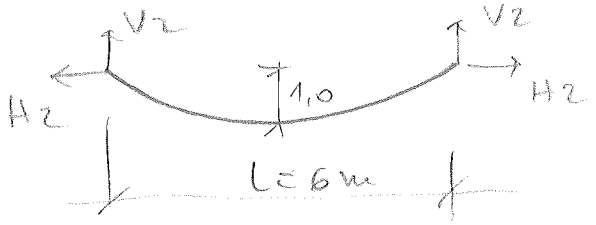
2)



$$H_1 = \frac{qL^2}{8f} = \frac{6000 \cdot 9^2}{8 \cdot 1} = 60750\ N$$

$$V_1 = \frac{qL}{2} = 27000\ N$$

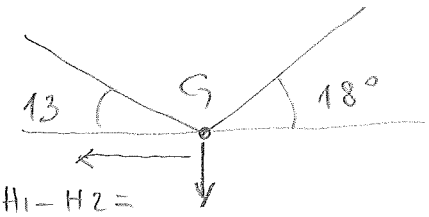
$$T_{1\,max} = 66480\ N \qquad \sigma = 125\ MPa$$

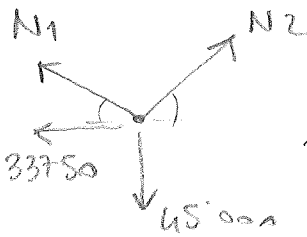


$$H_2 = \frac{qL^2}{8f} = \frac{6000 \cdot 6^2}{8 \cdot 1} = 27'000\ N$$

$$V_1 = \frac{qL}{2} = 18'000\ N$$

$$T_{2\,max} = 32450\ N \qquad \sigma = 61\ MPa$$





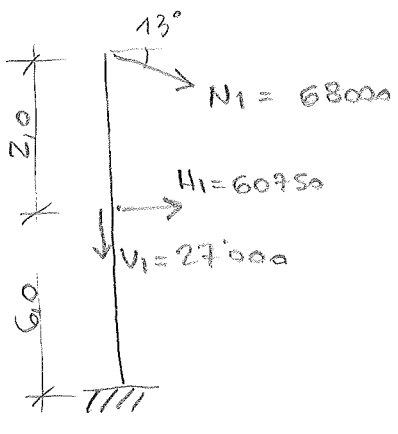
$$\uparrow\ N_1 \sin 13° + N_2 \sin 18° = 45000$$

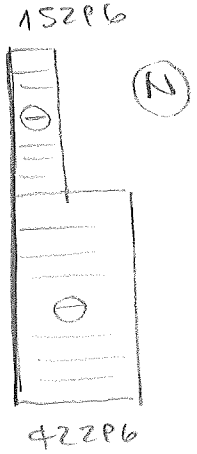
$$\rightarrow\ -N_1 \cos 13° + N_2 \cos 18° - 33750 = 0$$

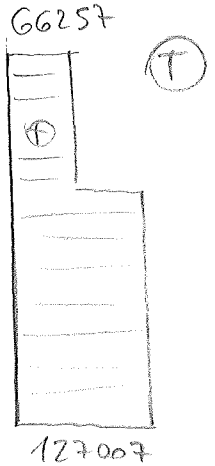
$$\begin{cases} N_1 = \dfrac{45000 - N_2 \sin 18°}{\sin 13°} \\ -\dfrac{45000 - N_2 \sin 18°}{\sin 13°} \cdot \cos 13° + N_2 \cos 18° - 33750 = 0 \end{cases}$$

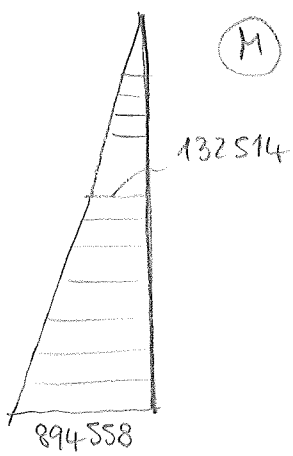
$N_2 = 96000\ N \qquad \sigma_2 = 136\ MPa$ Tensioni negli stralli IG, GJ

$N_1 = 68000\ N \qquad \sigma_1 = 92\ MPa$

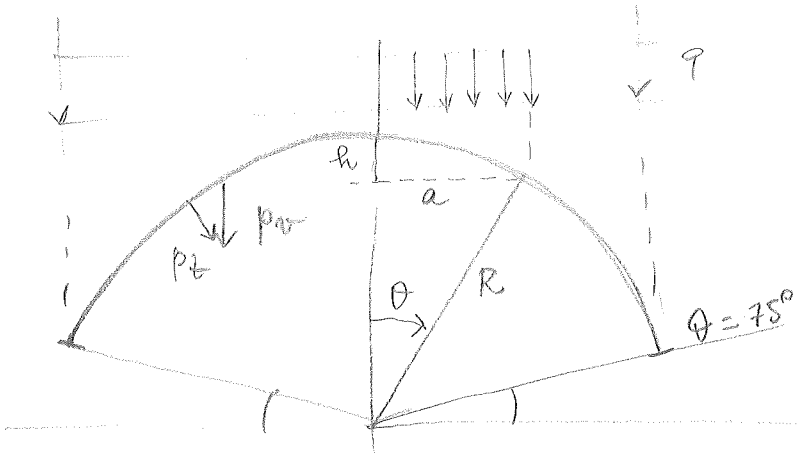








3) Calotta sferica



$a = R \sin\theta$

$Q(\theta) = \pi a^2 q = \pi R^2 \sin^2\theta \cdot q$

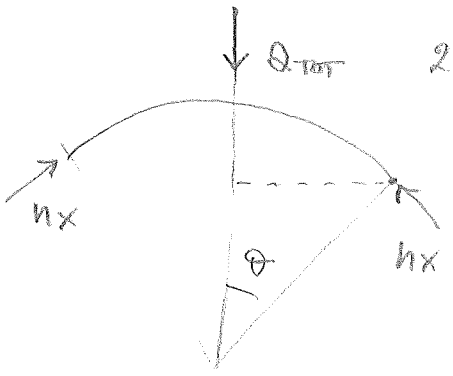
peso proprio:

$S(\theta) = 2\pi R h = 2\pi R(R - R\cos\theta)$

$Q_p(\theta) = 2\pi R^2 (1-\cos\theta)\gamma \cdot s$

$$Q_{tot}(\theta) = Q(\theta) + Q_p(\theta) =$$
$$= \pi R^2 \sin^2\theta \cdot q + 2\pi R^2 (1-\cos\theta)\gamma s$$
$$= \pi R^2 \left[q \cdot \sin^2\theta + 2\gamma(1-\cos\theta)s \right] \quad ; \quad p_z = (q+\gamma s)\cos\theta$$

Equilibrio verticale:



$$2\pi R \sin\theta \cdot n_x \sin\theta = Q_{tot}(\theta)$$

$$n_x(\theta) = \frac{\pi R^2 \left[q \sin^2\theta + 2\gamma(1-\cos\theta)s \right]}{2\pi R \sin^2\theta}$$

$$n_x(\theta) = \frac{R\left[q \sin^2\theta + 2\gamma(1-\cos\theta)s \right]}{2\sin^2\theta}$$

Equilibrio trasversale

$$\frac{n_x}{R_x} + \frac{n_y}{R_y} = -p_z \rightarrow \frac{n_x}{R} + \frac{n_y}{R} = -(q+\gamma s)\cos\theta$$

$$n_y = -R(q+\gamma s)\cos\theta - n_x = -R(q+\gamma s)\cos\theta - \frac{R\left[q\sin^2\theta + 2\gamma(1-\cos\theta)s \right]}{2\sin^2\theta}$$

$n_y = -p_z \cdot R - n_x$

$n_x(\theta = 75°) = -36710$ N/m $\quad \sigma_x = |-0{,}367|$ MPa $< 1{,}5$ MPa verificato

$n_y(\theta = 75°) = 20143$ N/m $\quad \sigma_y = +0{,}201$ MPa $> 0{,}06$ MPa non verificato