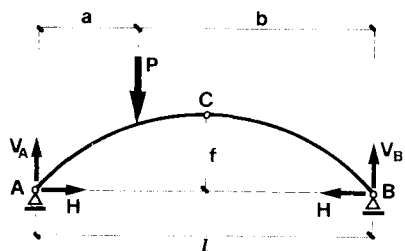
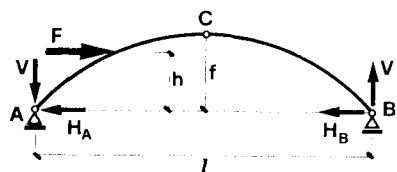


# ARCO A 3 CERNIERE



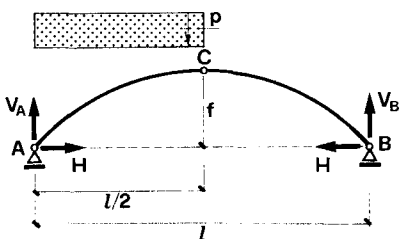
$$V_A = \frac{Pb}{l} \quad V_B = \frac{Pa}{l}$$

$$H = \frac{Pa}{2f} \quad \left( \text{valida per } a \leq \frac{l}{2} \right)$$



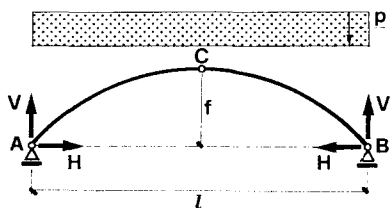
$$V = \frac{Fh}{l}$$

$$H_B = \frac{Fh}{2f} \quad H_A = F - H_B$$



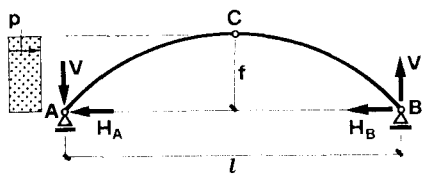
$$V_A = \frac{3}{8} pl \quad V_B = \frac{1}{8} pl$$

$$H = \frac{pl^2}{16f}$$



$$V = \frac{pl}{2}$$

$$H = \frac{pl^2}{8f}$$



$$V = \frac{pf^2}{2l}$$

$$H_A = \frac{3}{4} pf \quad H_B = \frac{1}{4} pf$$

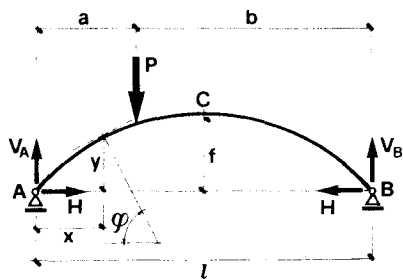
ARCO A 2 CERNIERE

Le formule contrassegnate con asterisco (\*) sono valide per arco a forma parabolica con:

$$y = \frac{4fx(i-x)}{l^2} \quad J_c = \frac{J_0}{\sin \varphi}$$

$$J_0 = \text{momento di inerzia in chiave} \quad \alpha = \frac{a}{l} \quad \beta = \frac{b}{l}$$

Per gli archi ribassati tale ipotesi coincide praticamente con quella della sezione costante.

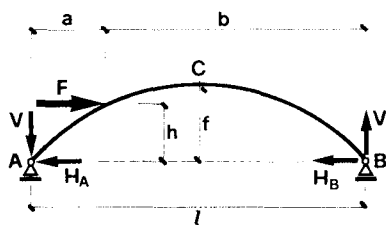


$$V_A = P\beta \quad V_B = P\alpha$$

$$H = \frac{5}{8} \frac{Pl}{f} \alpha \beta (1 + \alpha\beta) (*)$$

$$M_C = \frac{Pa}{2} - Hf \quad \left( \text{per } a \leq \frac{l}{2} \right)$$

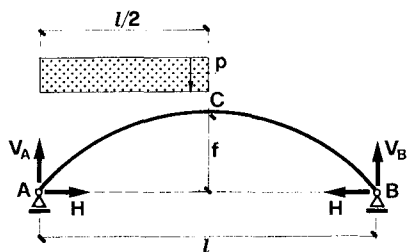
$$M_C = \frac{Pb}{2} - Hf \quad \left( \text{per } a > \frac{l}{2} \right)$$



$$V = \frac{Fh}{l}$$

$$H_A = \frac{F}{2} \beta (2 - 3\alpha + 2\alpha^2 + 12\alpha^3 - 8\alpha^4) (*)$$

$$H_B = F - H_A \quad M_C = \frac{Fh}{2} - H_B f$$

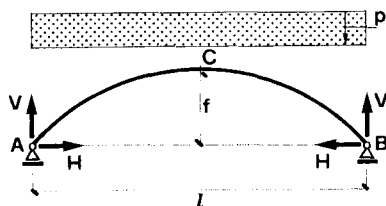


$$V_A = \frac{3}{8} pl$$

$$V_B = \frac{1}{8} pl$$

$$H = \frac{pl^2}{16f} (*)$$

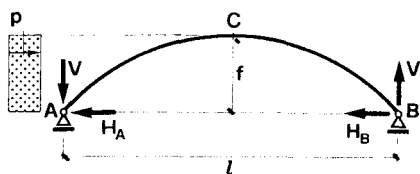
$$M_C = \frac{pl^2}{16} (*)$$



$$V = \frac{pl}{2}$$

$$H = \frac{pl^2}{8f} (*)$$

$$M_C = 0 (*)$$



$$V = \frac{pf^2}{2l}$$

$$H_A = \frac{5}{7} pf (*) \quad H_B = \frac{2}{7} pf (*)$$

$$M_C = -\frac{1}{28} pf^2 (*)$$

## ARCO INCASTRATO

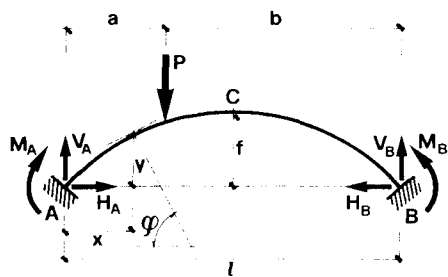
Le formule contrassegnate con asterisco (\*) sono valide per arco a forma parabolica con:

$$y = \frac{4fx(l-x)}{l^2}$$

$$J_x = \frac{J_0}{\sin \varphi}$$

$$J_0 = \text{momento di inerzia in chiave} \quad \alpha = \frac{a}{l} \quad \beta = \frac{b}{l}$$

Per gli archi ribassati tale ipotesi coincide praticamente con quella della sezione costante.



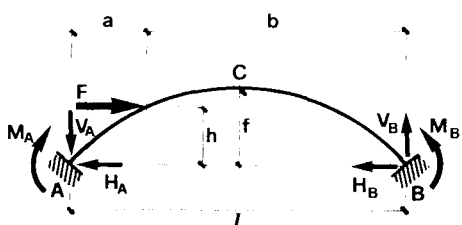
$$H = \frac{15}{4} \frac{Pa}{f} \alpha \beta^2 (*)$$

$$M_A = -\frac{Pa}{2} \beta^2 (5\beta - 3) (*)$$

$$M_B = -\frac{Pb}{2} \alpha^2 (5\alpha - 3) (*)$$

$$V_A = P\beta - \frac{M_A - M_B}{2} \quad V_B = P - V_A$$

$$M_C = M_B + \frac{1}{2} y_B l - Hf \quad \left( \text{vale per } a \leq \frac{l}{2} \right)$$



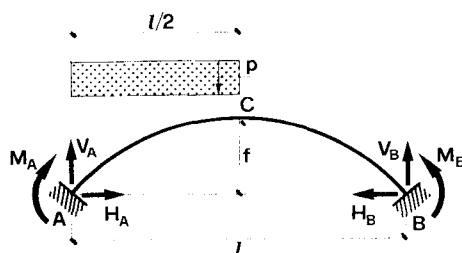
$$H_A = F\beta (1 + \alpha - 14\alpha^2 + 36\alpha^3 - 24\alpha^4) (*) \quad H_B = F - H_A$$

$$M_A = -2Ff\alpha\beta^2 (3 - 9\beta + 8\beta^2) (*)$$

$$M_B = 2Ff\alpha^2\beta (3 - 9\alpha + 8\alpha^2) (*)$$

$$V_A = V_B = \frac{Fh + M_A - M_B}{l}$$

$$M_C = \frac{yl}{2} - H_B f + M_B$$

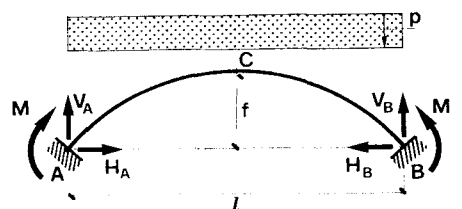


$$H = \frac{pl^2}{16f} (*)$$

$$M_A = -\frac{1}{64} pl^2 (*) \quad M_B = +\frac{1}{64} pl^2 (*)$$

$$V_A = \frac{13}{32} pl \quad V_B = \frac{3}{32} pl$$

$$M_C = 0 (*)$$

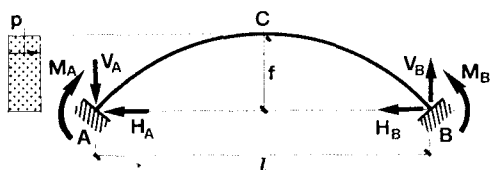


$$H_A = H_B = \frac{pl^2}{8f} (*)$$

$$M = 0 (*)$$

$$V_A = V_B = \frac{pl}{2}$$

$$M_C = 0 (*)$$



$$H_A = \frac{11}{14} pf (*)$$

$$H_B = \frac{3}{14} pf (*)$$

$$M_A = -\frac{51}{280} pf^2 (*)$$

$$M_B = \frac{19}{280} pf^2 (*)$$

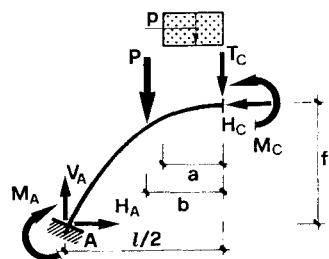
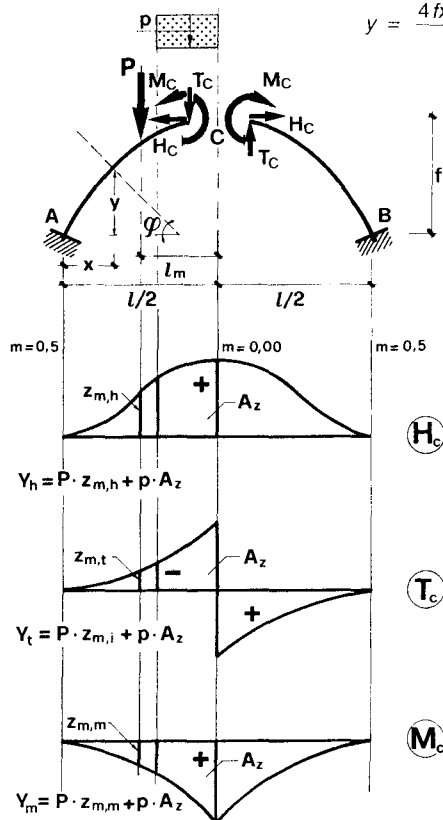
$$M_C = -\frac{3}{140} pf^2 (*)$$

$$V_A = V_B = \frac{pf}{4}$$

Arco incastrato comunque caricato con carichi verticali

$$J_c = \frac{J_c}{\sin \varphi}$$

$$y = \frac{4fx(l-x)}{l^2}$$



Incognite iperstatiche in chiave

$$H_c = Y_h \cdot \frac{l}{f}$$

$$T_c = Y_t$$

$$M_c = Y_m - Y_h \cdot \frac{f}{3}$$

dove  $Y_h$ ,  $Y_t$ ,  $Y_m$  sono coefficienti calcolati come prodotto dei carichi concentrati  $P$  per le ordinate  $z_{m,i}$  dei diagrammi, ovvero come prodotto del carico ripartito  $p$  per le aree sottese sui medesimi diagrammi.

Reazioni vincolari

$$H_A = H_c$$

$$V_A = T_c + P + p \cdot a$$

$$M_A = M_c + H_c \cdot f - T_c \cdot \frac{l}{2} -$$

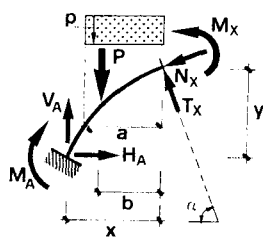
$$- P \cdot \left( \frac{l}{2} - b \right) - \frac{p \cdot a}{2} \cdot (l - a)$$

sul semiarco ove non esista carico si pone  $P = 0$   
e/o  $p = 0$ .

Valori delle ordinate z

m	$z_{mh}$	$z_{mt}$	$z_{mm}$
0,00	0,23438	0,50000	0,12500
0,05	0,22971	0,42525	0,10125
0,10	0,21600	0,35200	0,08000
0,15	0,19409	0,28175	0,06125
0,20	0,16538	0,21600	0,04500
0,25	0,13184	0,15625	0,03125
0,30	0,09600	0,10400	0,02000
0,35	0,06096	0,06075	0,01125
0,40	0,03038	0,02800	0,00500
0,45	0,00846	0,00725	0,00125
0,50	0,00000	0,00000	0,00000

Determinazione delle caratteristiche di sollecitazione su sezioni qualsiasi



$$N_i = H_A \cdot \sin \alpha + V_A \cdot \cos \alpha -$$

$$- P \cdot \cos \alpha - p \cdot a \cdot \cos \alpha$$

$$T_i = V_A \cdot \sin \alpha - H_A \cdot \cos \alpha -$$

$$- P \cdot \sin \alpha - p \cdot a \cdot \sin \alpha$$

$$M_i = M_A + V_A \cdot x - H_A \cdot y - P \cdot b - p \cdot \frac{a^2}{2}$$

Vedi anche in PRONT: "Arco con carichi distribuiti e concentrati" nella PARTE I - Caratteristiche di sollecitazione e spostamenti.

**TABELLA MUR.13 - SUPERFICI E VOLUMI DELLE VOLTE**

denominazione	superficie	volume	geometria
Volta a botte	$S = a \cdot l$	$V = a \cdot l \cdot s$	
Volta a bacino	$S = 2 \pi r^2$	$V = 2,094 (R^3 - r^3)$	
Volta sferica ad arco scemo	$S = 2 \pi r f$	$V = 2,094 \frac{f}{r} (R^3 - r^3)$	
Volta a vela a tutto sesto	a base: quadrata $S = 1,30 a^2$ pentagona $S = 2,37 a^2$ esagona $S = 3,76 a^2$ ottagona $S = 7,46 a^2$ decagona $S = 12,42 a^2$ rettangola $S = 3,14 R (a + b - 2R)$	$V = S \cdot s$ circa	
Volta a padiglione	$S = 1,14 (a \cdot b)$	$V = S \cdot s$ circa	
Volta a crociera a tutto sesto	$S = (a + b) \cdot f + (a \cdot b)$	$V = S \cdot s$ circa	