

Quadro contributi PLV per iperstatica $X=W_{AB}$

→	$M_x(x)$	$M_o(x)$	θ	$M_x M_o$	$M_x \theta$	$M_x M_x$	$\int M_x(M_o/EJ+\theta)dx$	$\int X M_x M_x/EJ dx$
AB b	$-1+x/b$	$-3/2Fx-1/2qx^2$	0	$3/2Fx-Fx^2/b-1/2qx^3/b$	0	$1-2x/b+x^2/b^2$	$(7/24+0)Fb^2/EJ$	$1/3Xb/EJ$
BA b	x/b	$2Fb-5/2Fx+1/2qx^2$	0	$2Fx-5/2Fx^2/b+1/2qx^3/b$	0	x^2/b^2		
BC b	0	$-2Fb+2Fx$	0	0	0	0	0+0	0
CB b	0	$2Fx$	0	0	0	0		
AD 2b	1	$-5/4Fx+1/2qx^2$	0	$-5/4Fx+1/2Fx^2/b$	0	1	$(-7/6+0)Fb^2/EJ$	$2Xb/EJ$
DA 2b	-1	$1/2Fb+3/4Fx-1/2qx^2$	0	$-1/2Fb-3/4Fx+1/2Fx^2/b$	0	1		
DE b	$1-x/b$	$-1/2Fb+1/2Fx$	0	$-1/2Fb+Fx-1/2Fx^2/b$	0	$1-2x/b+x^2/b^2$	$(-1/6+0)Fb^2/EJ$	$1/3Xb/EJ$
ED b	$-x/b$	$1/2Fx$	0	$-1/2Fx^2/b$	0	x^2/b^2		
EF b	0	0	0	0	0	0	0+0	0
FE b	0	0	0	0	0	0		
FG b	0	$1/2Fx-1/2qx^2$	0	0	0	0	0+0	0
GF b	0	$-1/2Fx+1/2qx^2$	0	0	0	0		
GC b	0	0	0	0	0	0	0+0	0
CG b	0	0	0	0	0	0		
HG b	0	0	0	0	0	0	0+0	0
GH b	0	0	0	0	0	0		
HB b	0	$-5/4Fb+5/4Fx$	$-Fb/EJ$	0	0	0	0+0	0
BH b	0	$5/4Fx$	Fb/EJ	0	0	0		
HE b	0	$5/4Fb-5/4Fx$	0	0	0	0	0+0	0
EH b	0	$-5/4Fx$	0	0	0	0		
AB	molla asta $-W_{1AB}(W_{0AB}+XW_{1AB})/k_{AB}$							$1/4Xb/EJ$
	totali						$-25/24Fb^2/EJ$	$35/12Xb/EJ$
	iperstatica $X=W_{AB}$						$5/14Fb$	

Sviluppi di calcolo iperstatica

$$L_{AB}^{xx} = \int_0^b (1 - 2x/b + x^2/b^2) \cdot 1/EJ \, dx + 1 \cdot 1/4 \cdot b/EJ = \left[x - x^2/b + 1/3 x^3/b^2 \right]_0^b \cdot 1/EJ + 1 \cdot 1/4 \cdot b/EJ$$

$$= (b - b + 1/3 b) \cdot 1/EJ + 1 \cdot 1/4 \cdot b/EJ = 7/12 \cdot b/EJ$$

$$L_{BA}^{xx} = \int_0^b (x^2/b^2) \cdot 1/EJ \, dx + 1 \cdot 1/4 \cdot b/EJ = \left[1/3 x^3/b^2 \right]_0^b \cdot 1/EJ + 1 \cdot 1/4 \cdot b/EJ$$

$$= (1/3 b) \cdot 1/EJ + 1 \cdot 1/4 \cdot b/EJ = 7/12 \cdot b/EJ$$

$$L_{AD}^{xx} = \int_0^{2b} (1) \cdot 1/EJ \, dx = \left[x \right]_0^{2b} \cdot 1/EJ$$

$$= (2b) \cdot 1/EJ = 2 \cdot b/EJ$$

$$L_{DA}^{xx} = \int_0^{2b} (1) \cdot 1/EJ \, dx = \left[x \right]_0^{2b} \cdot 1/EJ$$

$$= (2b) \cdot 1/EJ = 2 \cdot b/EJ$$

$$L_{DE}^{xx} = \int_0^b (1 - 2x/b + x^2/b^2) \cdot 1/EJ \, dx = \left[x - x^2/b + 1/3 x^3/b^2 \right]_0^b \cdot 1/EJ$$

$$= (b - b + 1/3 b) \cdot 1/EJ = 1/3 \cdot b/EJ$$

$$L_{ED}^{xx} = \int_0^b (x^2/b^2) \cdot 1/EJ \, dx = \left[1/3 x^3/b^2 \right]_0^b \cdot 1/EJ$$

$$= (1/3 b) \cdot 1/EJ = 1/3 \cdot b/EJ$$

$$L_{AB}^{xo} = \int_0^b (3/2 x/b - x^2/b^2 - 1/2 x^3/b^3) \cdot Fb \cdot 1/EJ \, dx + 1 \cdot 0 \cdot 1/4 \cdot Fb^2/EJ$$

$$= \left[3/4 x^2/b - 1/3 x^3/b^2 - 1/8 x^4/b^3 \right]_0^b \cdot Fb \cdot 1/EJ + 1 \cdot 0 \cdot 1/4 \cdot Fb^2/EJ$$

$$= (3/4 b - 1/3 b - 1/8 b) \cdot Fb \cdot 1/EJ + 1 \cdot 0 \cdot 1/4 \cdot Fb^2/EJ = 7/24 \cdot Fb^2/EJ$$

$$L_{BA}^{xo} = \int_0^b (2x/b - 5/2 x^2/b^2 + 1/2 x^3/b^3) \cdot Fb \cdot 1/EJ \, dx + 1 \cdot 0 \cdot 1/4 \cdot Fb^2/EJ$$

$$= \left[x^2/b - 5/6 x^3/b^2 + 1/8 x^4/b^3 \right]_0^b \cdot Fb \cdot 1/EJ + 1 \cdot 0 \cdot 1/4 \cdot Fb^2/EJ$$

$$= (b - 5/6 b + 1/8 b) \cdot Fb \cdot 1/EJ + 1 \cdot 0 \cdot 1/4 \cdot Fb^2/EJ = 7/24 \cdot Fb^2/EJ$$

$$L_{AD}^{xo} = \int_0^{2b} (-5/4 x/b + 1/2 x^2/b^2) \cdot Fb \cdot 1/EJ \, dx = \left[-5/8 x^2/b + 1/6 x^3/b^2 \right]_0^{2b} \cdot Fb \cdot 1/EJ$$

$$= (-5/2 b + 4/3 b) \cdot Fb \cdot 1/EJ = -7/6 \cdot Fb^2/EJ$$

$$L_{DA}^{xo} = \int_0^{2b} (-1/2 - 3/4 x/b + 1/2 x^2/b^2) \cdot Fb \cdot 1/EJ \, dx = \left[-1/2 x - 3/8 x^2/b + 1/6 x^3/b^2 \right]_0^{2b} \cdot Fb \cdot 1/EJ$$

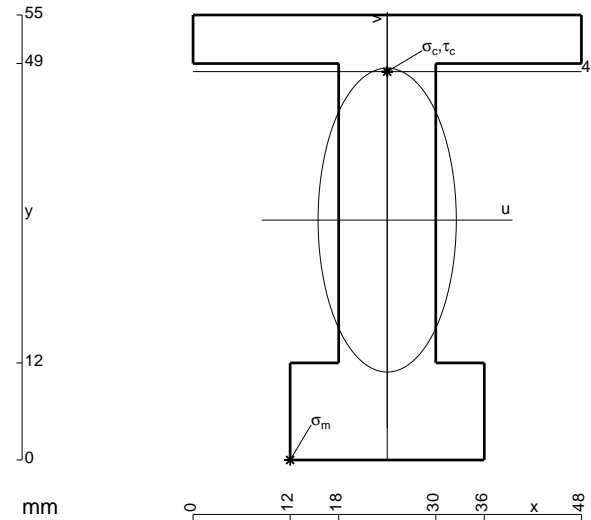
$$= (-b - 3/2 b + 4/3 b) \cdot Fb \cdot 1/EJ = -7/6 \cdot Fb^2/EJ$$

$$L_{DE}^{xo} = \int_0^b (-1/2 + x/b - 1/2 x^2/b^2) \cdot Fb \cdot 1/EJ \, dx = \left[-1/2 x + 1/2 x^2/b - 1/6 x^3/b^2 \right]_0^b \cdot Fb \cdot 1/EJ$$

$$= (-1/2 b + 1/2 b - 1/6 b) \cdot Fb \cdot 1/EJ = -1/6 \cdot Fb^2/EJ$$

$$L_{ED}^{xo} = \int_0^b (-1/2 x^2/b^2) \cdot Fb \cdot 1/EJ \, dx = \left[-1/6 x^3/b^2 \right]_0^b \cdot Fb \cdot 1/EJ$$

$$= (-1/6 b) \cdot Fb \cdot 1/EJ = -1/6 \cdot Fb^2/EJ$$



$$A = 1020. \text{ mm}^2$$

$$J_u = 360241. \text{ mm}^4$$

$$J_v = 74448. \text{ mm}^4$$

$$y_g = 29.65 \text{ mm}$$

$$T_y = 3220. \text{ N}$$

$$M_x = -2415000. \text{ Nmm}$$

$$x_m = 12. \text{ mm}$$

$$u_m = -12. \text{ mm}$$

$$v_m = -29.65 \text{ mm}$$

$$\sigma_m = -Mv/J_u = -198.8 \text{ N/mm}^2$$

$$x_c = 24. \text{ mm}$$

$$y_c = 48. \text{ mm}$$

$$v_c = 18.35 \text{ mm}$$

$$\sigma_c = -Mv/J_u = 123. \text{ N/mm}^2$$

$$\tau_c = 4.962 \text{ N/mm}^2$$

$$\sigma_q = \sqrt{\sigma^2 + 3\tau^2} = 123.3 \text{ N/mm}^2$$

$$S = 6662. \text{ mm}^3$$