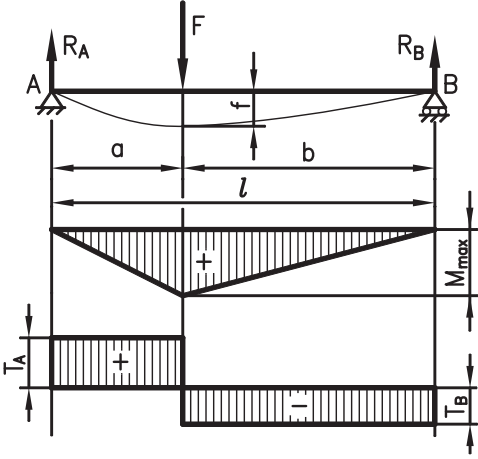
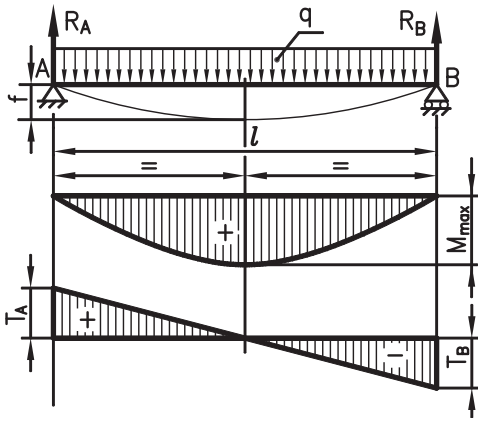
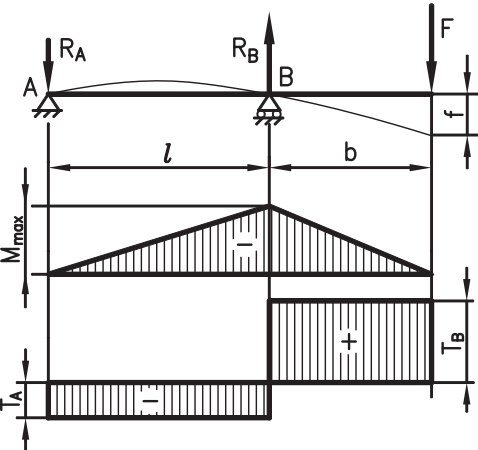


Tabella H.1 Travi variamente vincolate e sottoposte ai tipi di carichi più comuni

Schema	Relazioni
<p data-bbox="146 300 788 360">- Trave appoggiata agli estremi con carico concentrato</p> 	$R_A = \frac{b}{l} \cdot F; \quad R_B = \frac{a}{l} \cdot F$ $T_A = R_A; \quad T_B = -R_B$ $M_A = M_B = 0$ $M_{max} = R_A \cdot a = R_B \cdot b = \frac{a \cdot b}{l} \cdot F$ $f = \frac{1}{3} \cdot \frac{F \cdot a^2 \cdot b^2}{E \cdot I \cdot l}$
<p data-bbox="146 898 788 958">- Trave appoggiata agli estremi con carico uniformemente distribuito</p> 	$R_A = R_B = \frac{q \cdot l}{2}$ $T_A = R_A; \quad T_B = -R_B$ $M_A = M_B = 0$ $M_{max} = \frac{1}{8} \cdot q \cdot l^2$ $f = \frac{1}{384} \cdot \frac{q \cdot l^4}{E \cdot I}$
<p data-bbox="146 1458 788 1518">- Trave con un appoggio intermedio e con carico concentrato all'estremo del tratto a sbalzo</p> 	$R_A = \frac{b}{l} \cdot F; \quad R_B = \frac{l+a}{l} \cdot F$ $T_A = -\frac{b}{l} \cdot F; \quad T_B = F$ $M_A = 0$ $M_{max} = -F \cdot b$ $f = \frac{F}{E \cdot I} \cdot \frac{(l+b) \cdot b^2}{3}$

Continua

Tabella H.1 Travi variamente vincolate e sottoposte ai tipi di carichi più comuni

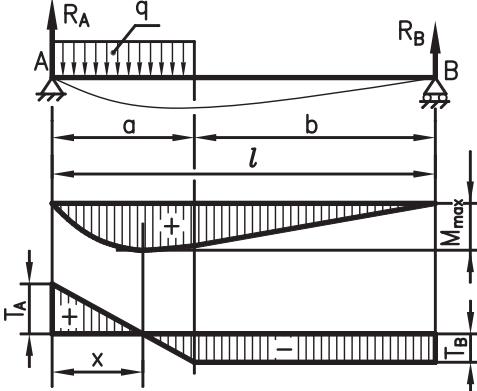
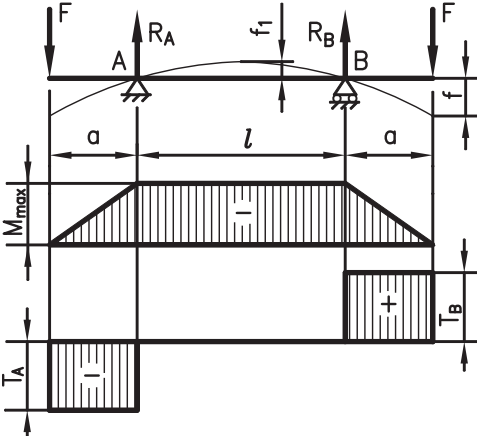
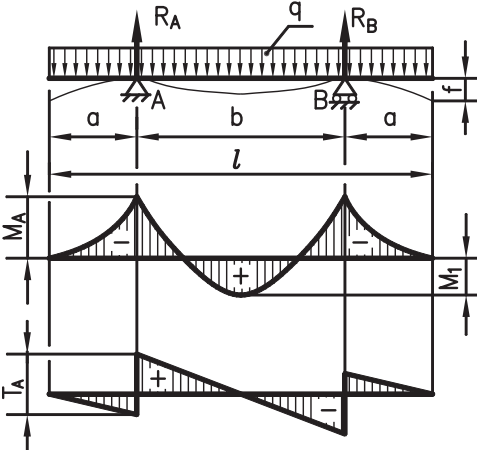
Schema	Relazioni
<p data-bbox="148 293 786 353">- Trave appoggiata agli estremi con carico uniformemente distribuito su un tratto</p> 	$R_A = q \cdot a \cdot \frac{a + 2b}{2l}; \quad R_B = q \cdot \frac{a^2}{2l}$ $T_A = R_A; \quad T_B = -R_B$ $M_A = M_B = 0$ $M_{max} = \frac{R_A^2}{q}$ $x = \frac{R_A}{q}$
<p data-bbox="148 853 786 913">- Trave simmetrica con appoggi intermedi e carichi concentrati agli estremi</p> 	$R_A = R_B = F$ $T_A = -R_A; \quad T_B = R_B$ $M_{max} = -F \cdot a$ $f_1 = \frac{F \cdot a \cdot l^2}{8 \cdot E \cdot I}$ $f = \frac{F \cdot a^2}{3 \cdot E \cdot I} \cdot \left(a + \frac{3l}{2} \right)$
<p data-bbox="148 1458 786 1518">- Trave simmetrica con appoggi intermedi e carico uniformemente distribuito</p> 	$R_A = R_B = \frac{q \cdot l^2}{2}$ $T_A = R_A ; \quad T_B = R_B $ $M_A = \frac{-q \cdot a}{2}$ $M_1 = \frac{q \cdot l^2}{4} \cdot \left(\frac{b}{l} - \frac{1}{2} \right)$ $f = \frac{q \cdot a}{24 \cdot E \cdot I} \cdot (3a^2 - b^3 + 6a^2 \cdot b)$

Tabella H.1 Travi variamente vincolate e sottoposte ai tipi di carichi più comuni

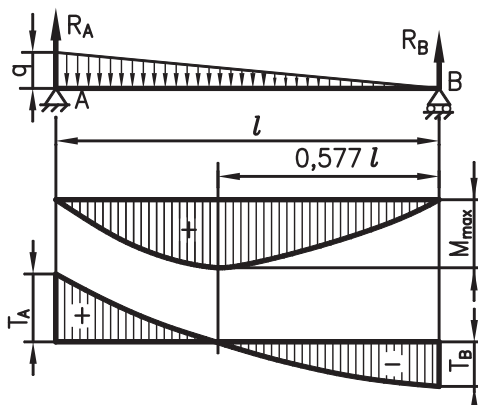
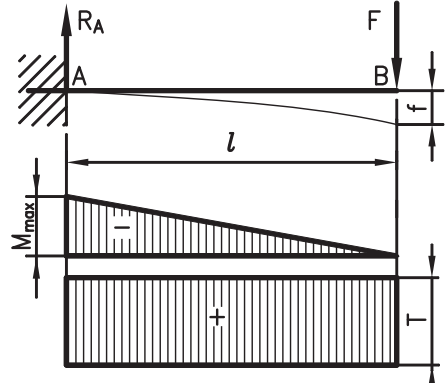
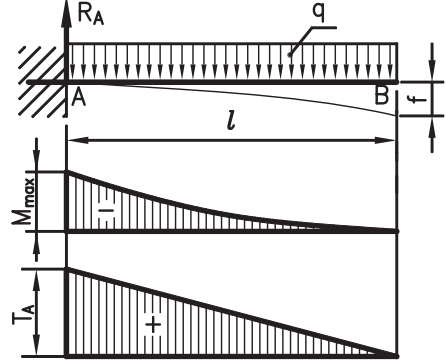
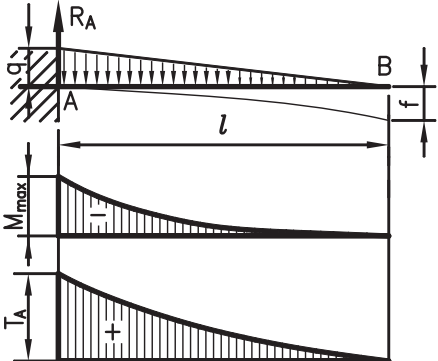
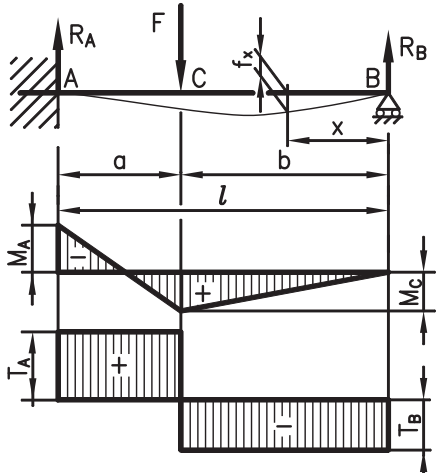
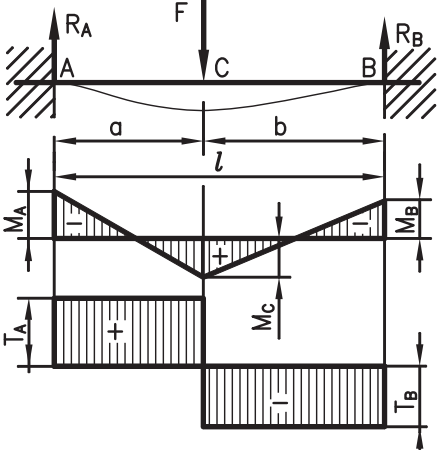
Schema	Relazioni
<p>- Trave appoggiata agli estremi con carico distribuito variabile con legge lineare (triangolare)</p> 	$R_A = \frac{q \cdot l}{3} \quad ; \quad R_B = \frac{q \cdot l}{6}$ $T_A = R_A; \quad T_B = -R_B$ $M_A = M_B = 0$ $M_{max} = \frac{16}{250} \cdot q \cdot l^2$ $f_{max} = 0,013 \cdot \frac{q \cdot l^4}{2E \cdot I}$
<p>- Trave incastrata a un estremo con carico concentrato all'estremo libero</p> 	$R_A = F$ $T = T_A = T_B = R_A$ $M_{max} = M_A = -F \cdot l$ $f = \frac{1}{3} \cdot \frac{F \cdot l^3}{E \cdot I}$
<p>- Trave incastrata a un estremo con carico uniformemente distribuito</p> 	$R_A = q \cdot l$ $T_A = R_A$ $M_{max} = M_A = -\frac{q \cdot l^2}{2}$ $f = \frac{1}{8} \cdot \frac{q \cdot l^4}{E \cdot I}$

Tabella H.1 Travi variamente vincolate e sottoposte ai tipi di carichi più comuni

Schema	Relazioni
<p>- Trave incastrata a un estremo con carico distribuito variabile con legge lineare (triangolare)</p> 	$R_A = \frac{q \cdot l}{2}$ $T_A = R_A$ $M_{max} = M_A = -\frac{q \cdot l^2}{6}$ $f = \frac{1}{30} \cdot \frac{q \cdot l^4}{E \cdot I}$
<p>- Trave incastrata a un estremo e appoggiata all'altro con carico concentrato</p> 	$R_A = \frac{F}{2l^3} \cdot (3l^2 - b^2) \cdot b ;$ $R_B = \frac{F}{2l^3} \cdot (2l + b) \cdot a^2$ $T_A = R_A; \quad T_B = -R_B$ $M_A = -\frac{F \cdot a \cdot b \cdot (l + b)}{2l^2}$ $M_C = \frac{F \cdot a^2 \cdot b \cdot (2l + b)}{2l^3}$ $f_C = \frac{F}{E \cdot I} \cdot \frac{a^3 \cdot b^2 \cdot (3l + b)}{12l^3}$ $f_x = \frac{F \cdot a^3}{12E \cdot I} \left[3b - (2l + b) \cdot \left(\frac{l-x}{l} \right) \right] \left(\frac{l-x}{l} \right)$
<p>- Trave incastrata ai due estremi con carico concentrato</p> 	$R_A = \frac{F \cdot (l + 2a) \cdot a^2}{l^3}$ $R_B = \frac{F \cdot (l + 2b) \cdot b^2}{l^3}$ $T_A = R_A; \quad T_B = -R_B$ $M_A = -\frac{F \cdot a \cdot b^2}{l^2}$ $M_B = -\frac{F \cdot a^2 \cdot b}{l^2}$ $M_C = \frac{2F \cdot a^2 \cdot b^2}{l^3}$ $f_C = \frac{F}{E \cdot I} \cdot \frac{a^3 \cdot b^3}{3l^3}$

Continua

Tabella H.1 Travi variamente vincolate e sottoposte ai tipi di carichi più comuni

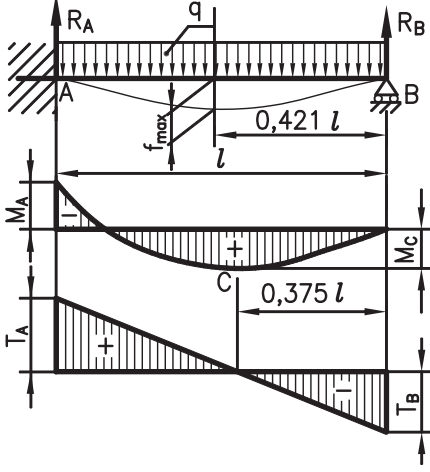
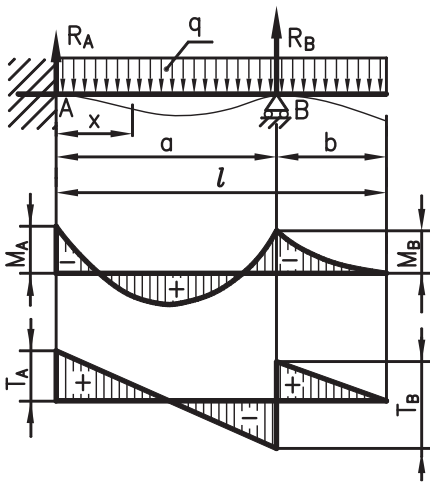
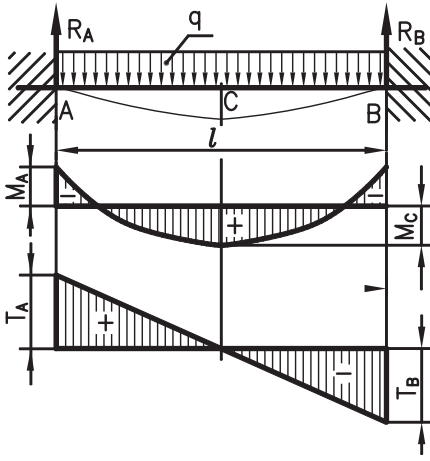
Schema	Relazioni
<p>- Trave incastrata a un estremo, appoggiata all'altro e con carico uniformemente distribuito</p> 	$R_A = \frac{5}{8} \cdot q \cdot l; \quad R_B = \frac{3}{8} \cdot q \cdot l$ $T_A = R_A; \quad T_B = -R_B$ $M_A = \frac{1}{8} \cdot q \cdot l^2$ $M_C = \frac{9}{158} \cdot q \cdot l^2$ $f = \frac{1}{185} \cdot \frac{q \cdot l^4}{E \cdot I}$
<p>- Trave incastrata a un estremo, con un appoggio intermedio e con carico uniformemente distribuito</p> 	$R_A = \frac{q \cdot l}{2} \cdot \left(3 - \frac{3l}{2a} - \frac{a}{4l} \right)$ $R_B = \frac{q \cdot l}{2} \cdot \left(\frac{3l}{2a} + \frac{a}{4l} - 1 \right)$ $T_A = R_A; \quad T_B = R_B $ $M_A = q \cdot l \cdot \frac{2b^2 - a^2}{8l}$ $M_B = -\frac{q \cdot b^2}{2}$ $M_A = M_{max} \quad \text{se } a > \sqrt{6} \cdot b$ $M_B = M_{max} \quad \text{se } a < \sqrt{6} \cdot b$
<p>- Trave incastrata ai due estremi e con carico uniformemente distribuito</p> 	$R_A = R_B = \frac{q \cdot l}{2}$ $T_A = R_A; \quad T_B = -R_B$ $M_A = M_B = -\frac{1}{12} \cdot q \cdot l^2$ $M_C = \frac{1}{24} \cdot q \cdot l^2$ $f = \frac{1}{384} \cdot \frac{q \cdot l^4}{E \cdot I}$

Tabella H.1 Travi variamente vincolate e sottoposte ai tipi di carichi più comuni

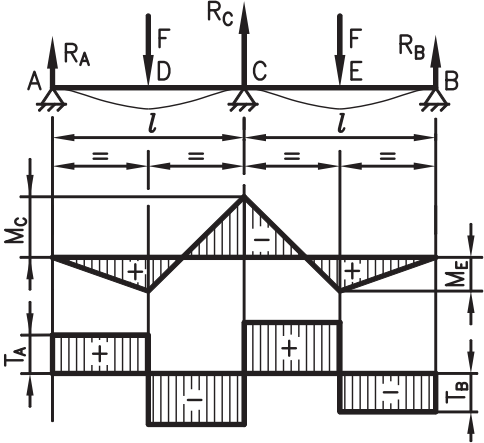
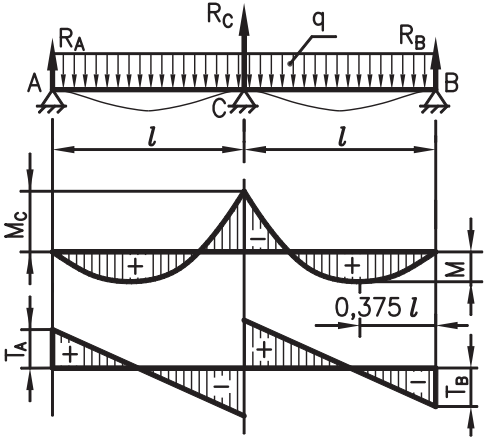
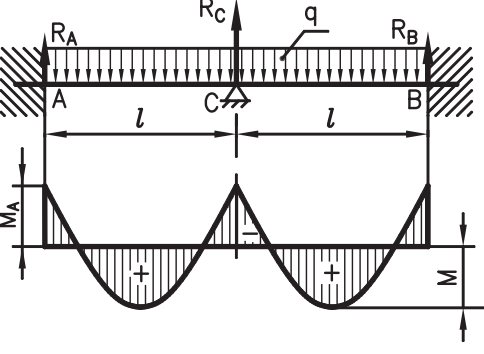
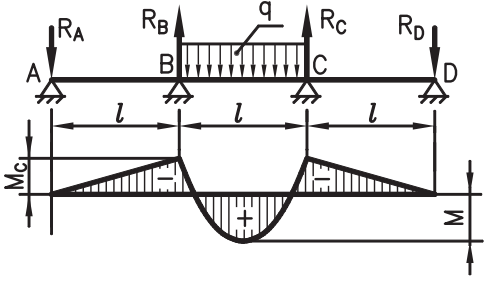
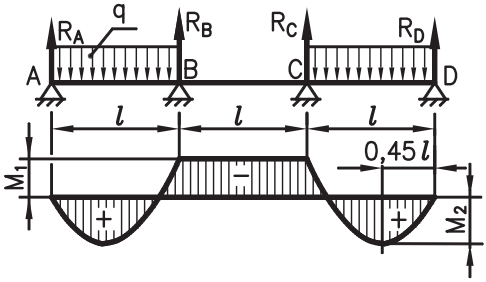
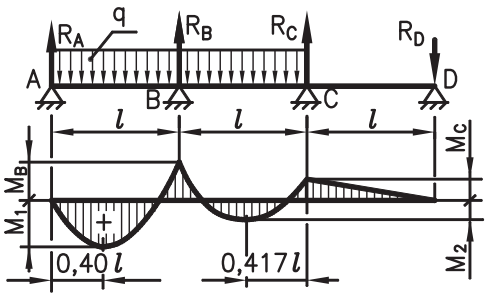
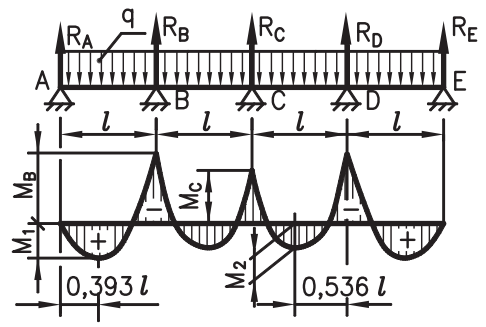
Schema	Relazioni
<p data-bbox="148 293 786 353">- Trave su tre appoggi simmetrici e con carichi concentrati equidistanti dagli appoggi</p>  <p>The diagram shows a beam of total length 2l, supported at points A, C, and B. Point C is the midpoint. Two point loads of magnitude F are applied at points D and E, which are at a distance l from C. The shear force diagram (T) shows a constant positive shear of F/2 from A to D, a jump to -F/2 at D, a constant negative shear of -F/2 from D to C, a jump to F/2 at C, a constant positive shear of F/2 from C to E, a jump to -F/2 at E, and a constant negative shear of -F/2 from E to B. The moment diagram (M) shows a linear increase from 0 at A to F·l/4 at D, a linear decrease to -3F·l/16 at C, a linear increase to F·l/4 at E, and a linear decrease to 0 at B.</p>	$R_A = R_B = \frac{5}{16} \cdot F; \quad R_C = \frac{22}{16} \cdot F$ $T_A = R_A; \quad T_B = -R_B$ $M_A = M_B = \frac{5}{32} \cdot F \cdot l$ $M_C = -\frac{3}{16} \cdot F \cdot l$
<p data-bbox="148 920 786 981">- Trave su tre appoggi simmetrici e con carico uniformemente distribuito</p>  <p>The diagram shows a beam of total length 2l, supported at points A, C, and B. A uniformly distributed load q is applied downwards. The shear force diagram (T) is a straight line from R_A at A to -R_B at B, crossing zero at a distance of 0.375l from B. The moment diagram (M) is a cubic curve, with a maximum positive moment of 9q·l²/128 at the midpoint C and a negative moment of -q·l²/8 at the supports A and B.</p>	$R_A = R_B = \frac{3}{8} \cdot q \cdot l; \quad R_C = \frac{5}{4} \cdot q \cdot l$ $T_A = R_A; \quad T_B = -R_B$ $M = \frac{9}{128} \cdot q \cdot l^2$ $M_C = -\frac{1}{8} \cdot q \cdot l^2$
<p data-bbox="148 1518 786 1608">- Trave simmetrica incastrata agli estremi, con un appoggio in mezzeria e con carico uniformemente distribuito</p>  <p>The diagram shows a beam of total length 2l, fixed at both ends A and B, and supported at its midpoint C. A uniformly distributed load q is applied downwards. The shear force diagram (T) is a straight line from R_A at A to -R_B at B, crossing zero at the midpoint C. The moment diagram (M) is a cubic curve, with a maximum positive moment of q·l²/24 at the midpoint C and a negative moment of -q·l²/12 at the fixed ends A and B.</p>	$R_A = R_B = \frac{1}{2} \cdot q \cdot l; \quad R_C = q \cdot l$ $M = \frac{1}{24} \cdot q \cdot l^2$ $M_A = M_B = M_C = -\frac{1}{12} \cdot q \cdot l^2$

Tabella H.1 Travi variamente vincolate e sottoposte ai tipi di carichi più comuni

Schema	Relazioni
<p>- Trave su quattro appoggi simmetrici e con carico uniformemente distribuito sulla campata centrale</p> 	$R_A = R_D = 0,005 \cdot q \cdot l$ $R_B = R_C = 0,550 \cdot q \cdot l$ $M = \frac{5}{67} \cdot q \cdot l^2$ $M_A = M_B = M_C = -\frac{1}{20} \cdot q \cdot l^2$
<p>- Trave su quattro appoggi simmetrici e con carico uniformemente distribuito sulle campate laterali</p> 	$R_A = R_D = 0,450 \cdot q \cdot l$ $R_B = R_C = 0,550 \cdot q \cdot l$ $M_1 = -\frac{1}{20} \cdot q \cdot l^2$ $M_2 = \frac{10}{99} \cdot q \cdot l^2$
<p>- Trave su quattro appoggi simmetrici e con carico uniformemente distribuito sulle campate laterali</p> 	$R_A = 0,383 \cdot q \cdot l; \quad R_B = 1,2 \cdot q \cdot l$ $R_C = 0,450 \cdot q \cdot l; \quad R_D = 0,033 \cdot q \cdot l$ $M_1 = \frac{1}{12,7} \cdot q \cdot l^2; \quad M_B = -\frac{1}{8,55} \cdot p \cdot l^2$ $M_C = -\frac{1}{30,3} \cdot q \cdot l^2; \quad M_2 = \frac{1}{18,3} \cdot q \cdot l^2$
<p>- Trave su cinque appoggi simmetrici e con carico uniformemente distribuito</p> 	$R_A = 0,393 \cdot q \cdot l; \quad R_B = 1,143 \cdot q \cdot l$ $R_C = 0,929 \cdot q \cdot l; \quad R_D = 1,143 \cdot q \cdot l$ $R_E = 0,393 \cdot q \cdot l$ $M_1 = \frac{1}{13} \cdot q \cdot l^2; \quad M_B = -\frac{1}{8,55} \cdot p \cdot l^2$ $M_C = -\frac{1}{14,1} \cdot q \cdot l^2; \quad M_2 = \frac{1}{27,75} \cdot q \cdot l^2$

Continua

Tabella H.1 Travi variamente vincolate e sottoposte ai tipi di carichi più comuni

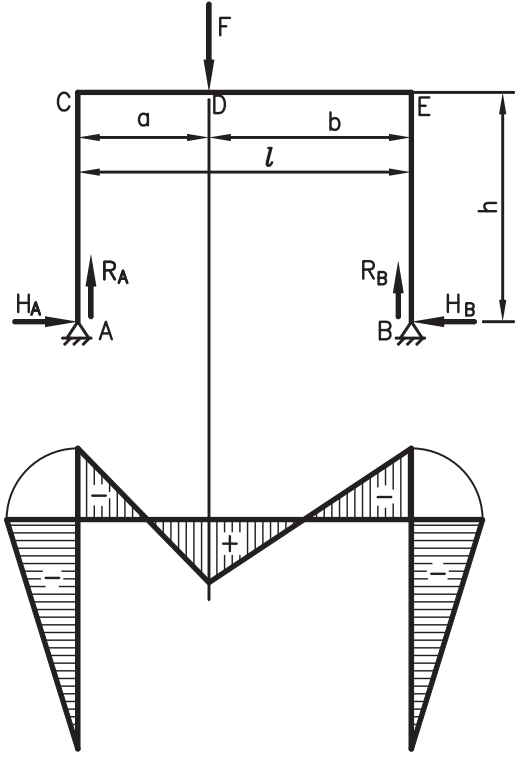
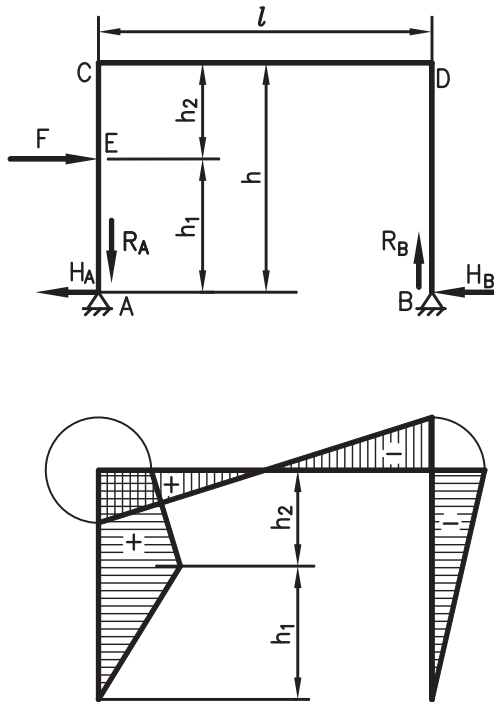
Schema	Relazioni
<p>- Telaio incernierato agli estremi e con carico concentrato sulla parte orizzontale</p> 	$R_A = \frac{F \cdot b}{l}; \quad R_B = \frac{F \cdot a}{l}$ $k = \frac{h}{l}$ $H_A = H_B = \frac{3 \cdot F \cdot a \cdot b}{2 \cdot h \cdot l \cdot (2k + 3)}$ $M_C = M_E = \frac{3 \cdot F \cdot a \cdot b}{2 \cdot l \cdot (2k + 3)}$ $M_D = \frac{F \cdot a \cdot b}{2l} \cdot \frac{4k + 3}{2k + 3}$
<p>- Telaio incernierato agli estremi e con carico concentrato su una parte verticale</p> 	$R_A = R_B = \frac{F \cdot h_1}{l}$ $H_A = \frac{F \cdot h}{2 \cdot l} \cdot \left[\frac{4h^3 + h_1^3 - 3h_1 \cdot h^2}{h \cdot (2h + 3l)} + \frac{6h \cdot l - 3h_1 \cdot h \cdot l}{h \cdot (2h + 3l)} \right]$ $H_B = F - H_A$ $M_E = H_A \cdot h; \quad M_C = H_A \cdot h - F \cdot h_2$ $M_D = -H_B \cdot h = -(F - H_A) \cdot h$

Tabella H.1 Travi variamente vincolate e sottoposte ai tipi di carichi più comuni

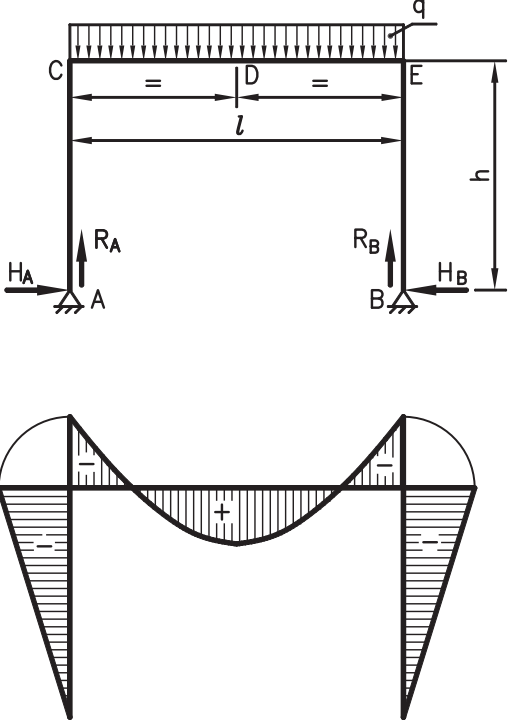
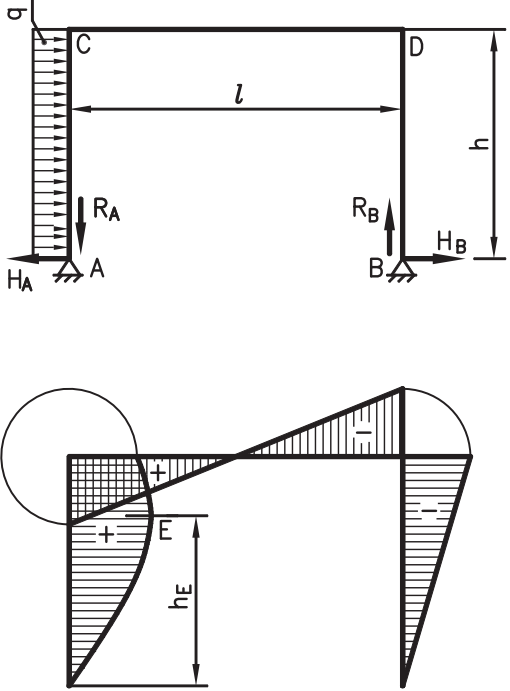
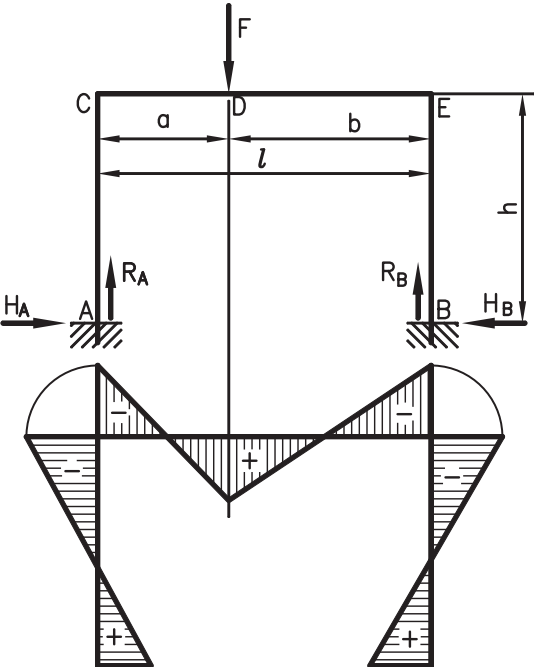
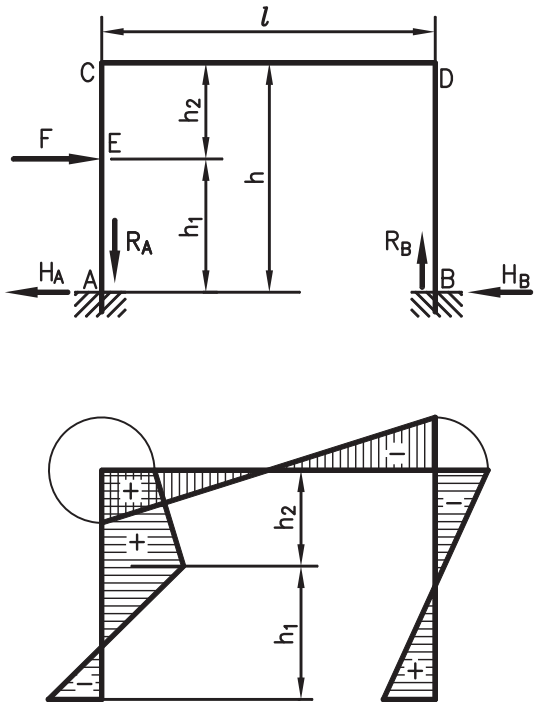
Schema	Relazioni
<p data-bbox="146 293 788 353">- Telaio incernierato agli estremi e con carico uniformemente distribuito sulla parte orizzontale</p> 	$R_A = R_B = \frac{q \cdot l}{2}$ $H_A = H_B = \frac{q \cdot l^2}{4h \cdot \left(2\frac{h}{l} + 3\right)}$ $M_D = \frac{q \cdot l^2}{8} \cdot \frac{2h + l}{2h + 3l}$ $M_C = M_E = \frac{q \cdot l^2}{4 \cdot \left(2\frac{h}{l} + 3\right)}$
<p data-bbox="146 1200 788 1261">- Telaio incernierato agli estremi e con carico uniformemente distribuito su una parte verticale</p> 	$R_A = R_B = \frac{q \cdot h^2}{2l}$ $H_A = \frac{q \cdot h}{8} \cdot \frac{11h + 18l}{2h + 3l}$ $H_B = q \cdot h - H_A$ $M_E = \frac{q \cdot h^2}{128} \cdot \left(\frac{11k + 18}{2k + 3}\right)^2; \quad k = \frac{h}{l}$ $h_E = \frac{h}{8} \cdot \left(\frac{11k + 18}{2k + 3}\right)$ $M_C = \frac{3}{8} \cdot q \cdot l^2 \cdot \frac{h + 2l}{2h + 3l}$ $M_D = -\frac{q \cdot h^2}{8} \cdot \frac{5k + 6}{2k + 3}$

Tabella H.1 Travi variamente vincolate e sottoposte ai tipi di carichi più comuni

Schema	Relazioni
<p>- Telaio incastrato agli estremi e con carico concentrato sulla parte orizzontale</p> 	$R_A = \frac{F \cdot b}{l} \cdot \frac{6 \cdot h \cdot l + l^2 + a \cdot l - 2a^2}{6 \cdot h \cdot l + l^2}$ $R_B = \frac{F \cdot a}{l} \cdot \frac{6 \cdot h \cdot l + 3 \cdot a \cdot l - 2a^2}{6 \cdot h \cdot l + l^2}$ $H_A = H_B = \frac{3 \cdot F \cdot a \cdot b}{2 \cdot h \cdot l \cdot \left(\frac{h}{l} + 2\right)}$ $M_A = \frac{F \cdot a \cdot b}{2l} \cdot \frac{5 \cdot h \cdot l - l^2 + 2a \cdot (h + 2l)}{(h + 2l) \cdot (6h + l)}$ $M_B = \frac{F \cdot a \cdot b}{2l} \cdot \frac{3l + 7 \cdot h \cdot l - 2a \cdot (h + 2l)}{(h + 2l) \cdot (6h + l)}$ $M_C = M_A - H_A \cdot h$ $M_E = M_B - H_B \cdot h$ $M_D = M_A - H_A \cdot h + R_A \cdot a$
<p>- Telaio incastrato agli estremi e con carico concentrato su una parte verticale</p> 	$R_A = R_B = \frac{3 \cdot F \cdot h_1^2}{6 \cdot h \cdot l + l^2}; \quad H_A = F - H_B$ $H_B = \frac{F \cdot h_1}{2 \cdot h^2 \cdot \left(\frac{h}{l} + 2\right)} \cdot \left[3 \cdot \left(\frac{h}{l} + 1\right) - \frac{h_1}{h} \cdot \left(2 \cdot \frac{h}{l} + 1\right) \right]$ $M_A = -\frac{F \cdot h_1^2}{2h} \cdot \left[\frac{2h}{h_1} - \frac{3h \cdot l + 2h^2 - h \cdot (h + l)}{h^2 + 2 \cdot h \cdot l} - \frac{3h^2}{6 \cdot h^2 + h \cdot l} \right]$ $M_B = \frac{F \cdot h_1^2}{2 \cdot h} \cdot \left[\frac{3 \cdot h \cdot l + 2h^2 - h \cdot (h + l)}{h^2 + 2 \cdot h \cdot l} - \frac{3h^2}{6 \cdot h^2 + h \cdot l} \right]$ $M_E = M_A + H_A \cdot h_1$ $M_D = M_B - H_B \cdot h$ $M_C = M_A + H_A \cdot h_1 - F \cdot h_2$

ROTAZIONI NOTEVOLI DI TRAVI ISOSTATICHE^a

^aAutore: Fabrizio Barpi, Novembre 2007 (<http://staff.polito.it/fabrizio.barpi>).

1 Travi cerniera–appoggio

	$\varphi_A = \frac{Pab(\ell + b)}{6\ell EI}$ $\varphi_B = \frac{Pab(\ell + a)}{6\ell EI}$ $\left\{ \begin{array}{l} a = \frac{\ell}{2} \\ b = \frac{\ell}{2} \end{array} \right. : \varphi_A = \frac{P\ell^2}{16EI}, \varphi_B = \frac{P\ell^2}{16EI}$		$\varphi_A = \frac{7q_0\ell^3}{360EI}$ $\varphi_B = \frac{q_0\ell^3}{45EI}$
	$\varphi_A = \frac{m(3b^2 - \ell^2)}{6\ell EI}$ $\varphi_B = \frac{m(3a^2 - \ell^2)}{6\ell EI}$ $\left\{ \begin{array}{l} a = 0 \\ b = \ell \end{array} \right. : \varphi_A = \frac{m\ell}{3EI}, \varphi_B = \frac{m\ell}{6EI}$		$\varphi_A = \frac{(8q_A + 7q_B)\ell^3}{360EI}$ $\varphi_B = \frac{(7q_A + 8q_B)\ell^3}{360EI}$
	$\varphi_A = \frac{qa^2(a + 2b)^2}{24\ell EI}$ $\varphi_B = \frac{qa^2(2\ell^2 - a^2)}{24\ell EI}$ $\left\{ \begin{array}{l} a = \ell \\ b = 0 \end{array} \right. : \varphi_A = \frac{q\ell^3}{24EI}, \varphi_B = \frac{q\ell^3}{24EI}$		$\varphi_A = \frac{\alpha\Delta T\ell}{h}$ $\varphi_B = \frac{\alpha\Delta T\ell}{h}$ $\left(\chi^{\Delta T} = 2\frac{\alpha\Delta T}{h} \right)$

2 Travi doppio-pendolo–appoggio

	$\varphi_A = 0,$ $\varphi_B = \frac{P(\ell^2 - a^2)}{2EI}$ $\left\{ \begin{array}{l} a = 0 \\ b = \ell \end{array} \right. : \varphi_A = 0, \varphi_B = \frac{P\ell^2}{2EI}$		$\varphi_A = 0,$ $\varphi_B = \frac{q_0\ell^3}{8EI}$
	$\varphi_A = 0,$ $\varphi_B = \frac{ma}{EI}$ $\left\{ \begin{array}{l} a = \ell \\ b = 0 \end{array} \right. : \varphi_A = 0, \varphi_B = \frac{m\ell}{EI}$		$\varphi_A = 0,$ $\varphi_B = \frac{(5q_A + 3q_B)\ell^3}{24EI}$
	$\varphi_A = 0,$ $\varphi_B = \frac{qa(3\ell^2 - a^2)}{6EI}$ $\left\{ \begin{array}{l} a = \ell \\ b = 0 \end{array} \right. : \varphi_A = 0, \varphi_B = \frac{q\ell^3}{3EI}$		$\varphi_A = 0,$ $\varphi_B = 2\frac{\alpha\Delta T\ell}{h}$ $\left(\chi^{\Delta T} = 2\frac{\alpha\Delta T}{h} \right)$

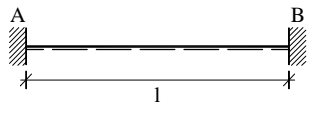
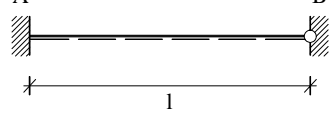
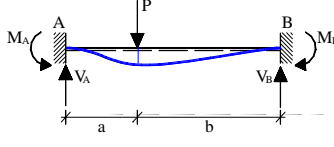
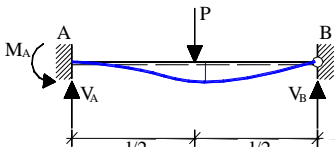
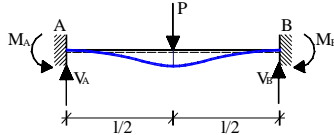
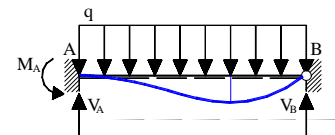
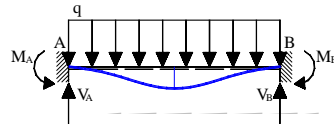
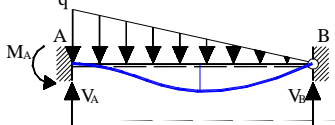
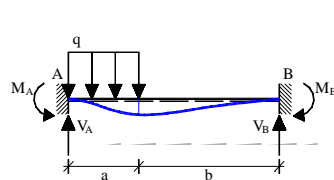
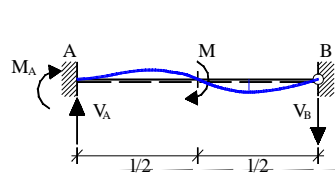
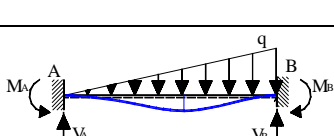
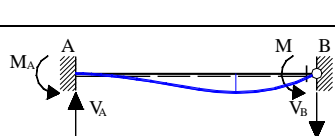
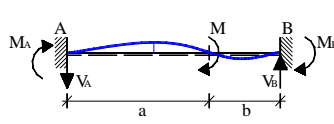
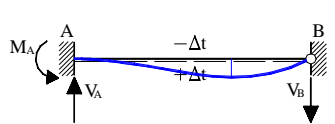
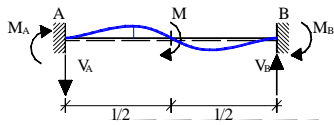
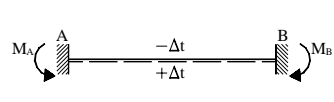
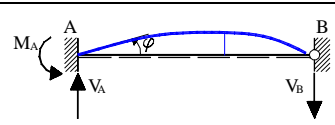
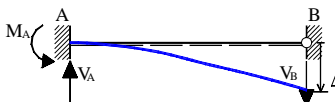
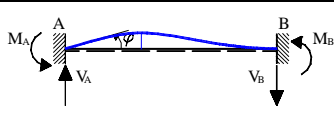
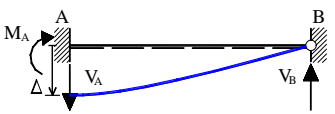

3 Note

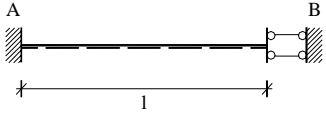
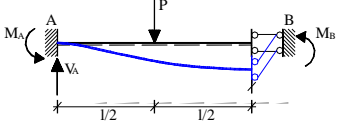
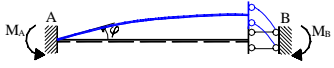
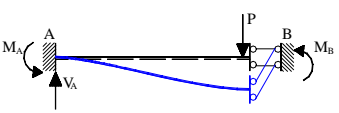

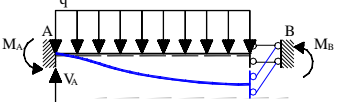
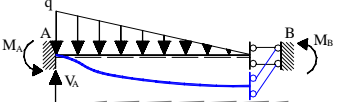
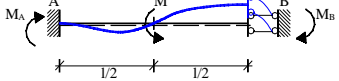
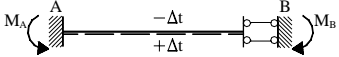
Le rotazioni presentate nei riquadri precedenti sono da considerarsi *in modulo*; il segno va valutato *di volta in volta* in base alla deformata causata dalla *condizione di carico* in esame nel *punto scelto*.

Si è indicata con h l'altezza della trave e con $\chi^{\Delta T}$ la curvatura dovuta alla variazione termica di intensità totale, in valore assoluto, $\Delta T - (-\Delta T) = 2\Delta T$.

Gli schemi elementari indicati sopra sono gli *unici consentiti* nell'utilizzo del Metodo dei Telai; svincolare in modo diverso porta a soluzioni errate!

SOLUZIONI DI TRAVI ELEMENTARI VARIAMENTE CARICATE

Travi con doppio incastro		Travi con incastro e cerniera	
CARICHI ESTERNI		CARICHI ESTERNI	
	$V_A = \frac{Pb^2}{l^3}(1+2a); \quad V_B = \frac{Pa^2}{l^3}(1+2b)$ $M_A = -\frac{Pab^2}{l^2}; \quad M_B = \frac{Pa^2b}{l^2}$		$V_A = \frac{11}{16}P; \quad V_B = \frac{5}{16}P$ $M_A = \frac{3}{16}Pl$
	$V_A = V_B = \frac{P}{2}$ $M_A = M_B = \frac{Pl}{8}$		$V_A = \frac{5}{8}ql; \quad V_B = \frac{3}{8}ql$ $M_A = \frac{ql^2}{8}$
	$V_A = V_B = \frac{ql}{2}$ $M_A = M_B = \frac{ql^2}{12}$		$V_A = \frac{2}{5}ql; \quad V_B = \frac{ql}{10}$ $M_A = \frac{ql^2}{15}$
	$V_A = \frac{qa}{2} \left(2 - \frac{2a^2}{l^2} + \frac{a^3}{l^3} \right);$ $V_B = \frac{qa^3}{2l^2} \left(2 - \frac{a}{l} \right)$ $M_A = -qa^2 \left(\frac{1}{2} - \frac{2a}{3l} + \frac{a^2}{4l^2} \right);$ $M_B = -qa^2 \left(\frac{a}{3l} - \frac{a^2}{4l^2} \right)$		$V_A = -V_B = \frac{9}{8} \frac{M}{l}$ $M_A = \frac{M}{8}$
	$V_A = \frac{3}{20}ql; \quad V_B = \frac{7}{20}ql$ $M_A = \frac{1}{30}ql^2; \quad M_B = \frac{1}{20}ql^2$		$V_A = -V_B = \frac{3}{2} \frac{M}{l}$ $M_A = \frac{M}{2}$
	$V_A = -V_B = -\frac{6Mab}{l^3}$ $M_A = M \frac{b}{l} \left(2 - 3 \frac{b}{l} \right);$ $M_B = -M \frac{a}{l} \left(2 - 3 \frac{a}{l} \right)$		$V_A = -V_B = \frac{3}{2} \frac{\alpha \Delta t EJ}{lh}$ $M_A = \frac{3}{2} \frac{\alpha \Delta t EJ}{h}$
	$V_A = -V_B = \frac{3}{2} \frac{M}{l}$ $M_A = M_B = \frac{M}{4}$	DISTORSIONI VINCOLARI	
	$M_A = -M_B = \frac{\alpha \Delta t EJ}{h}$		$V_A = -V_B = \frac{3\phi EJ}{l^2}$ $M_A = \frac{3\phi EJ}{l}$
	$V_A = -V_B = \frac{3\Delta EJ}{l^3}$ $M_A = \frac{3\Delta EJ}{l^2}$	DISTORSIONI VINCOLARI	
	$V_A = -V_B = \frac{6\phi EJ}{l^2}$ $M_A = \frac{4\phi EJ}{l}; \quad M_B = \frac{2\phi EJ}{l}$		$V_A = -V_B = \frac{3\Delta EJ}{l^3}$ $M_A = \frac{3\Delta EJ}{l^2}$
	$V_A = -V_B = \frac{12\Delta EJ}{l^3}$ $M_A = M_B = \frac{6\Delta EJ}{l^2}$		

Travi con incastro e doppio pendolo		
CARICHI ESTERNI		DISTORSIONI VINCOLARI
	$V_A = P$ $M_A = \frac{3}{8}Pl; M_B = \frac{Pl}{8}$	 $M_A = -M_B = \frac{\phi EJ}{l}$
	$V_A = P$ $M_A = M_B = \frac{Pl}{2}$	
	$V_A = ql$ $M_A = \frac{ql^2}{3}; M_B = \frac{ql^2}{6}$	
	$V_A = \frac{ql}{2}$ $M_A = \frac{ql^2}{8}; M_B = \frac{ql^2}{24}$	
	$M_A = M_B = \frac{M}{2}$	
	$M_A = -M_B = \frac{\alpha \Delta t EJ}{h}$	