

Verso effettivo dei carichi riportato nel disegno.

Calcolare reazioni vincolari della struttura e delle aste.

Tracciare i diagrammi delle azioni interne nelle aste.

Esprimere le funzioni delle azioni interne nelle aste.

Calcolare spostamento e rotazione di tutti i nodi.

$u_A$   $v_A$   $\phi_A$  spostamento assoluto del nodo A.

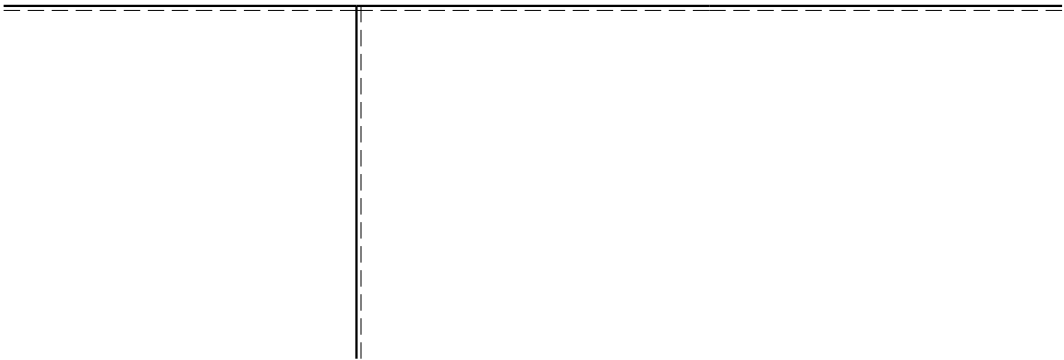
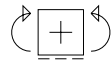
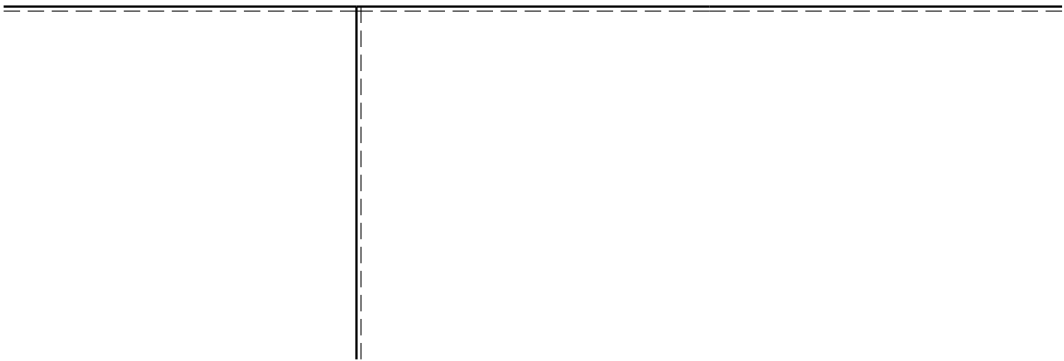
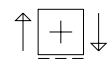
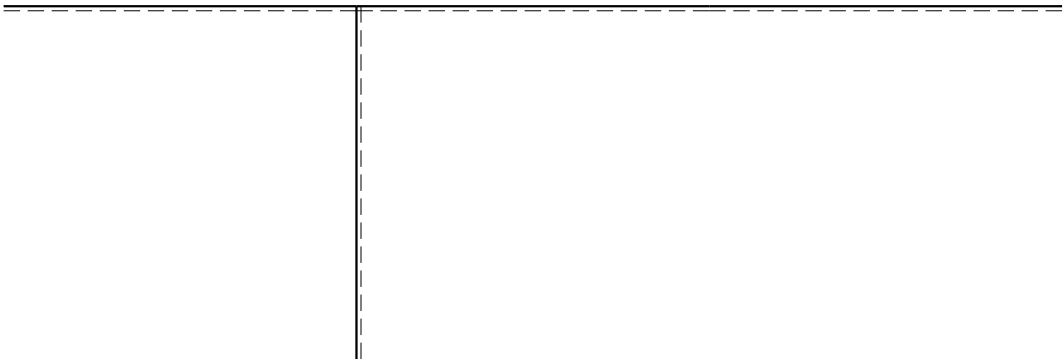
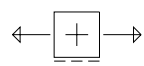
$J_{AB}$   $x_{AB}$   $\psi_{AB}$  riferimento locale asta AB con origine in A.

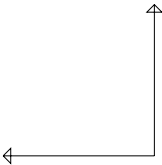
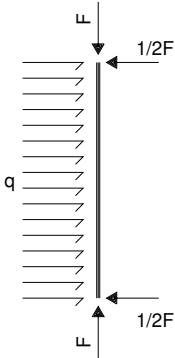
<>

<>

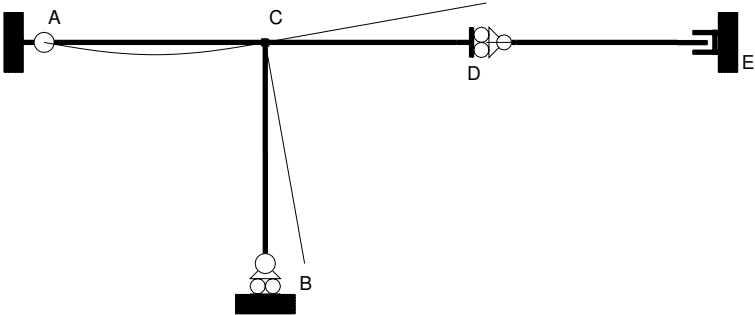
<>

<>

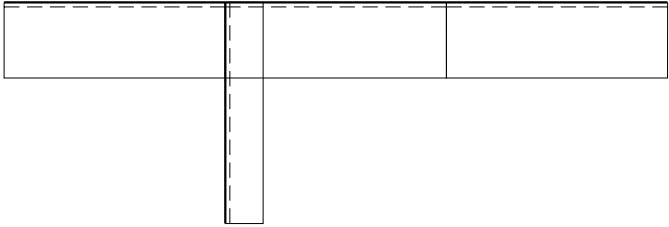




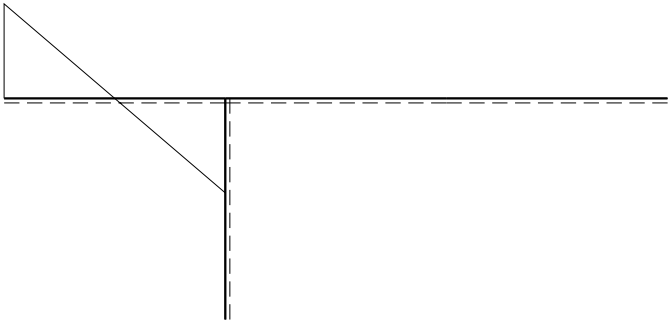
$0.08 Fb^3/EJ$



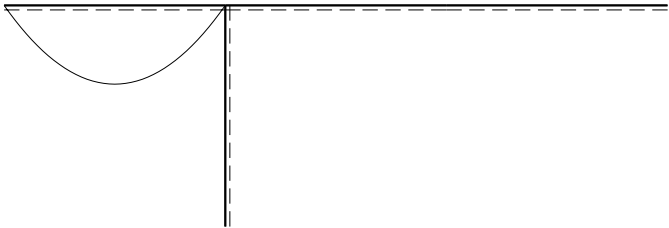
$1 F$



$0.4 F$



$0.12 Fb$



## REAZIONI

$$H_A = F = F$$

$$V_A = 1/2qb = 1/2F$$

$$V_B = 1/2qb = 1/2F$$

$$V_E = 0$$

$$W_E = 0$$

$$H_{AC} = F = F$$

$$V_{AC} = 1/2qb = 1/2F$$

$$W_{AC} = 0$$

$$H_{CA} = -F = -F$$

$$V_{CA} = 1/2qb = 1/2F$$

$$W_{CA} = 0$$

$$H_{BC} = 0$$

$$V_{BC} = 1/2qb = 1/2F$$

$$W_{BC} = 0$$

$$H_{CB} = 0$$

$$V_{CB} = -1/2qb = -1/2F$$

$$W_{CB} = 0$$

$$H_{CD} = F = F$$

$$V_{CD} = 0$$

$$W_{CD} = 0$$

$$H_{DC} = -F = -F$$

$$V_{DC} = 0$$

$$W_{DC} = 0$$

$$H_{DE} = F = F$$

$$V_{DE} = 0$$

$$W_{DE} = 0$$

$$H_{ED} = -F = -F$$

$$V_{ED} = 0$$

$$W_{ED} = 0$$

## SPOSTAMENTI NODALI

$$u_A = 0$$

$$v_A = 0$$

$$\phi_{AAC} = -1/24(qb^3/EJ) = -1/24(Fb^2/EJ)$$

$$u_{BBC} = 1/24(qb^4/EJ) = 1/24(Fb^3/EJ)$$

$$v_B = 0$$

$$\phi_{BBC} = 1/24(qb^3/EJ) = 1/24(Fb^2/EJ)$$

$$u_C = 0$$

$$v_C = 0$$

$$\phi_C = 1/24(qb^3/EJ) = 1/24(Fb^2/EJ)$$

$$u_D = 0$$

$$v_{DDE} = 0$$

$$\phi_{DDE} = 0$$

$$u_{EED} = 0$$

$$v_E = 0$$

$$\phi_E = 0$$

## AZIONI INTERNE (coordinate locali)

$$N_{AC} = -F$$

$$T_{AC} = 1/2F - qx$$

$$M_{AC} = 1/2Fx - 1/2qx^2$$

$$N_{BC} = -1/2F$$

$$T_{BC} = 0$$

$$M_{BC} = 0$$

$$N_{CD} = -F$$

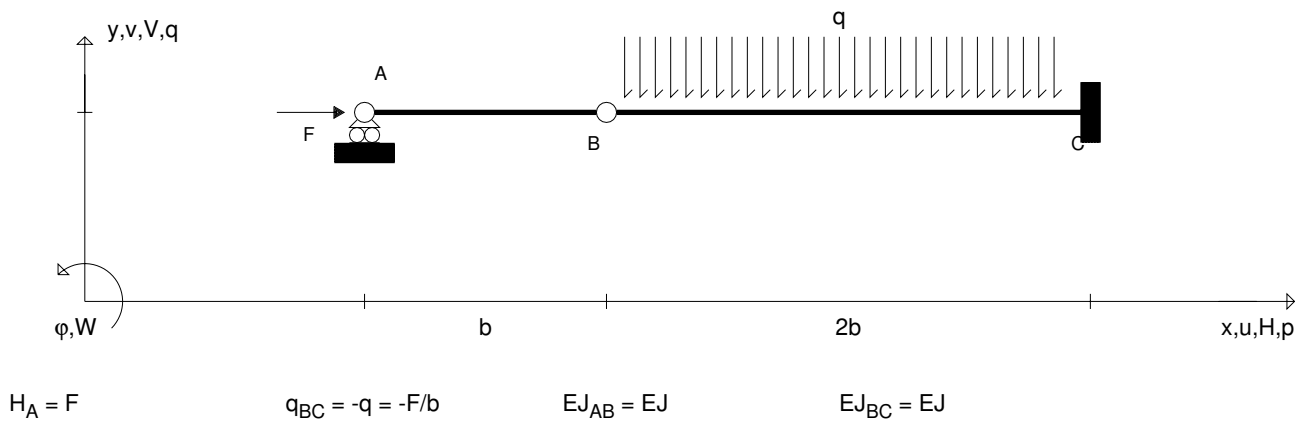
$$T_{CD} = 0$$

$$M_{CD} = 0$$

$$N_{DE} = -F$$

$$T_{DE} = 0$$

$$M_{DE} = 0$$



Verso effettivo dei carichi riportato nel disegno.

Calcolare reazioni vincolari della struttura e delle aste.

Tracciare i diagrammi delle azioni interne nelle aste.

Esprimere le funzioni delle azioni interne nelle aste.

Calcolare spostamento e rotazione di tutti i nodi.

$u_A$   $v_A$   $\phi_A$  spostamento assoluto del nodo A.

$J_{AB}$   $x_{AB}$   $\vartheta_{AB}$  riferimento locale asta AB con origine in A.

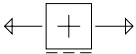
<>

<>

<>

<>

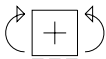
\_\_\_\_\_

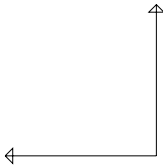
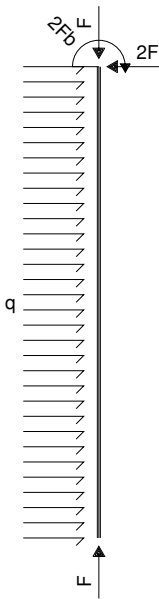


\_\_\_\_\_



\_\_\_\_\_





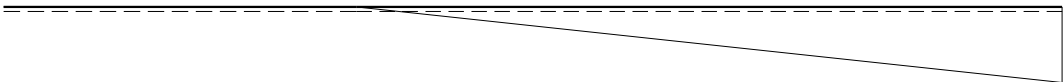




$4 Fb^3/EJ$



$1 F$



$2 F$



$2 Fb$

## REAZIONI

$$V_A = 0$$

$$W_B = 0$$

$$H_C = -F = -F$$

$$V_C = 2qb = 2F$$

$$W_C = -2qb^2 = -2Fb$$

$$H_{AB} = F = F$$

$$V_{AB} = 0$$

$$W_{AB} = 0$$

$$H_{BA} = -F = -F$$

$$V_{BA} = 0$$

$$W_{BA} = 0$$

$$H_{BC} = F = F$$

$$V_{BC} = 0$$

$$W_{BC} = 0$$

$$H_{CB} = -F = -F$$

$$V_{CB} = 2qb = 2F$$

$$W_{CB} = -2qb^2 = -2Fb$$

## SPOSTAMENTI NODALI

$$u_{AAB} = 0$$

$$v_A = 0$$

$$\varphi_{AAB} = -2(qb^3/EJ) = -2(Fb^2/EJ)$$

$$u_B = 0$$

$$v_B = -2(qb^4/EJ) = -2(Fb^3/EJ)$$

$$\varphi_B = 0$$

$$u_C = 0$$

$$v_C = 0$$

$$\varphi_C = 0$$

## AZIONI INTERNE (coordinate locali)

$$N_{AB} = -F$$

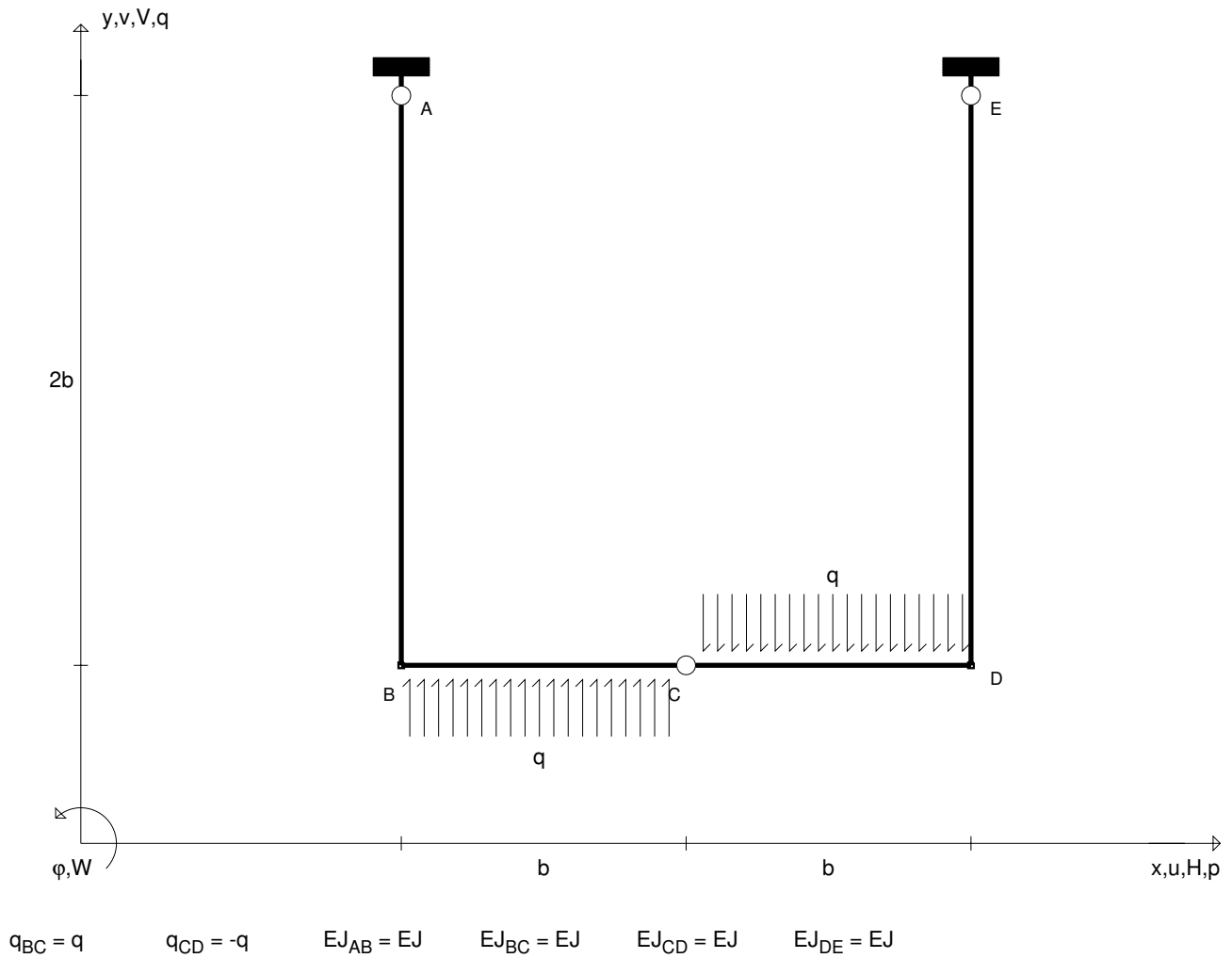
$$T_{AB} = 0$$

$$M_{AB} = 0$$

$$N_{BC} = -F$$

$$T_{BC} = -qx$$

$$M_{BC} = -1/2qx^2$$



Verso effettivo dei carichi riportato nel disegno.

Calcolare reazioni vincolari della struttura e delle aste.

Tracciare i diagrammi delle azioni interne nelle aste.

Esprimere le funzioni delle azioni interne nelle aste.

Calcolare spostamento e rotazione di tutti i nodi.

$u_A$   $v_A$   $\phi_A$  spostamento assoluto del nodo A.

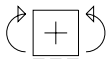
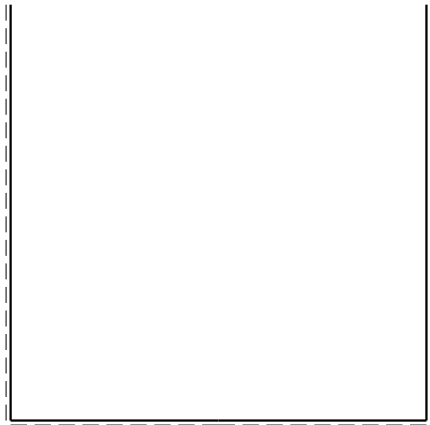
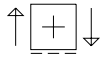
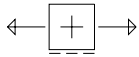
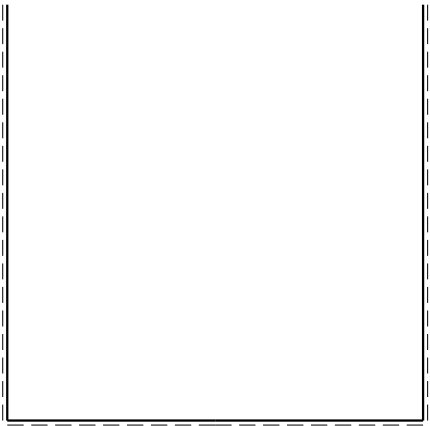
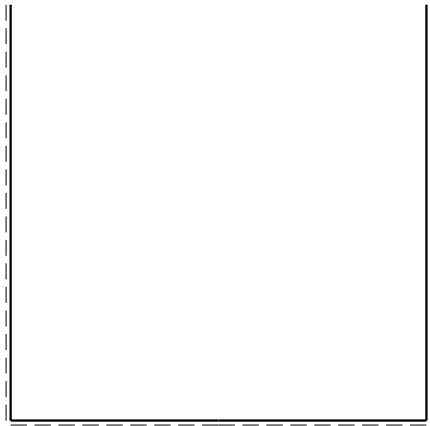
$J_{AB}$   $x_{AB}$   $\vartheta_{AB}$  riferimento locale asta AB con origine in A.

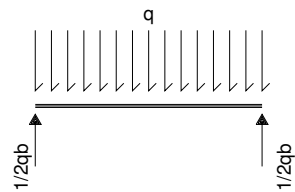
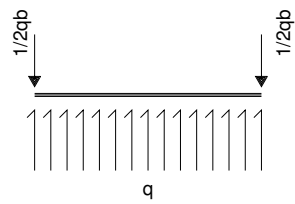
<>

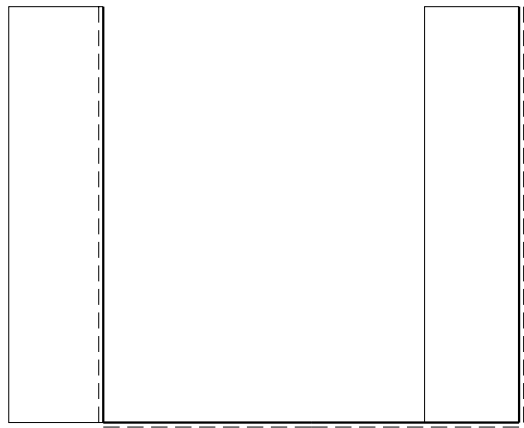
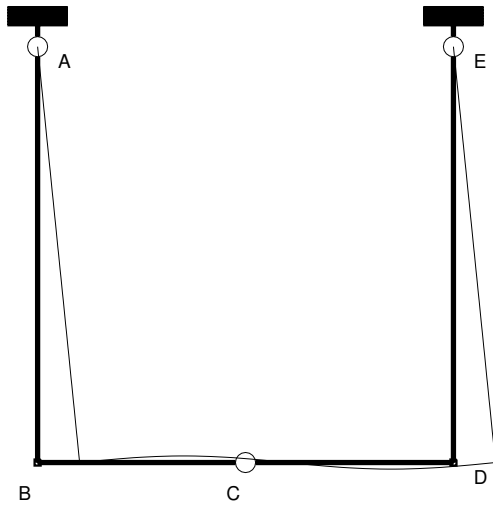
<>

<>

<>

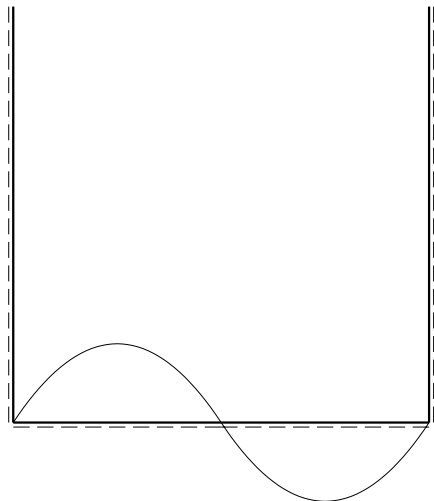
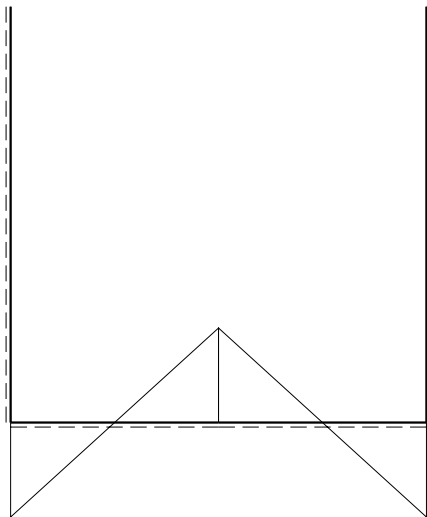






$0.15 \frac{qb^4}{EJ}$

$0.4 qb$



$0.4 qb$

$0.12 qb^2$

## REAZIONI

$$H_A = 0$$

$$V_A = -1/2qb$$

$$W_C = 0$$

$$H_E = 0$$

$$V_E = 1/2qb$$

$$H_{AB} = 0$$

$$V_{AB} = -1/2qb$$

$$W_{AB} = 0$$

$$H_{BA} = 0$$

$$V_{BA} = 1/2qb$$

$$W_{BA} = 0$$

$$H_{BC} = 0$$

$$V_{BC} = -1/2qb$$

$$W_{BC} = 0$$

$$H_{CB} = 0$$

$$V_{CB} = -1/2qb$$

$$W_{CB} = 0$$

$$H_{CD} = 0$$

$$V_{CD} = 1/2qb$$

$$W_{CD} = 0$$

$$H_{DC} = 0$$

$$V_{DC} = 1/2qb$$

$$W_{DC} = 0$$

$$H_{DE} = 0$$

$$V_{DE} = -1/2qb$$

$$W_{DE} = 0$$

$$H_{ED} = 0$$

$$V_{ED} = 1/2qb$$

$$W_{ED} = 0$$

## SPOSTAMENTI NODALI

$$u_A = 0$$

$$v_A = 0$$

$$\phi_{AAB} = 1/24(qb^3/EJ)$$

$$u_B = 1/12(qb^4/EJ)$$

$$v_B = 0$$

$$\phi_B = 1/24(qb^3/EJ)$$

$$u_C = 1/12(qb^4/EJ)$$

$$v_C = 0$$

$$\phi_C = 0$$

$$u_D = 1/12(qb^4/EJ)$$

$$v_D = 0$$

$$\phi_D = 1/24(qb^3/EJ)$$

$$u_E = 0$$

$$v_E = 0$$

$$\phi_{EED} = 1/24(qb^3/EJ)$$

## AZIONI INTERNE (coordinate locali)

$$N_{AB} = -1/2qb$$

$$T_{AB} = 0$$

$$M_{AB} = 0$$

$$N_{BC} = 0$$

$$T_{BC} = -1/2qb + qx$$

$$M_{BC} = -1/2qbx + 1/2qx^2$$

$$N_{CD} = 0$$

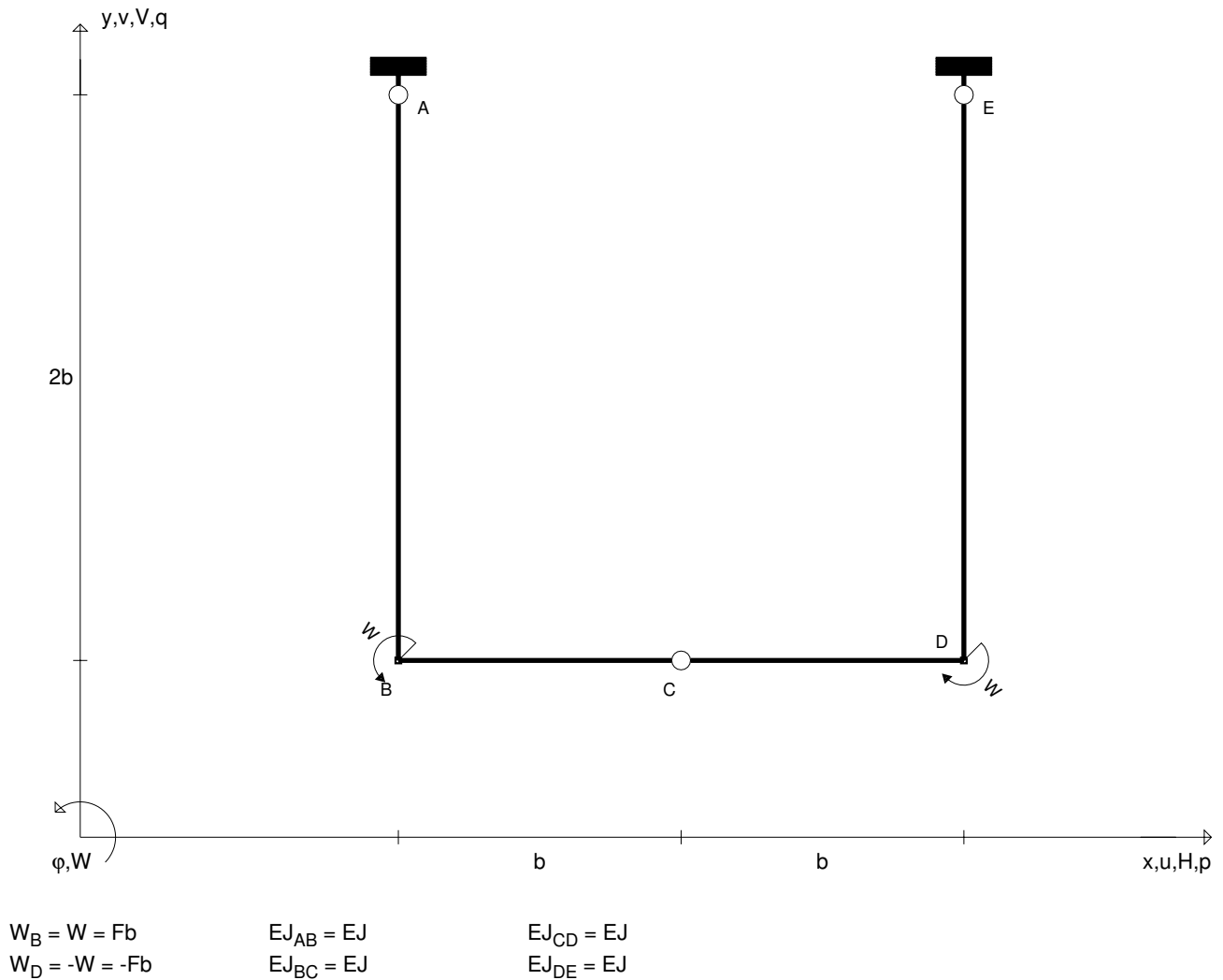
$$T_{CD} = 1/2qb - qx$$

$$M_{CD} = 1/2qbx - 1/2qx^2$$

$$N_{DE} = 1/2qb$$

$$T_{DE} = 0$$

$$M_{DE} = 0$$



Verso effettivo dei carichi riportato nel disegno.

Calcolare reazioni vincolari della struttura e delle aste.

Tracciare i diagrammi delle azioni interne nelle aste.

Esprimere le funzioni delle azioni interne nelle aste.

Calcolare spostamento e rotazione di tutti i nodi.

$u_A$   $v_A$   $\phi_A$  spostamento assoluto del nodo A.

$J_{AB}$   $x_{AB}$   $\vartheta_{AB}$  riferimento locale asta AB con origine in A.

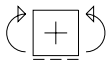
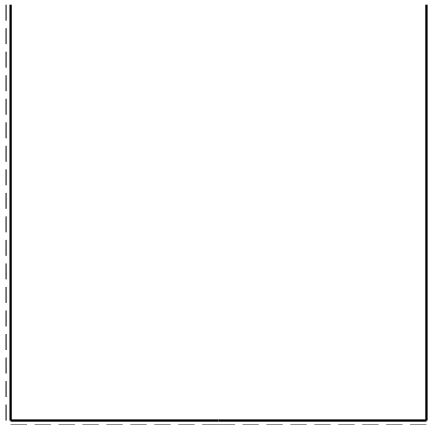
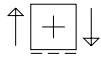
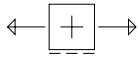
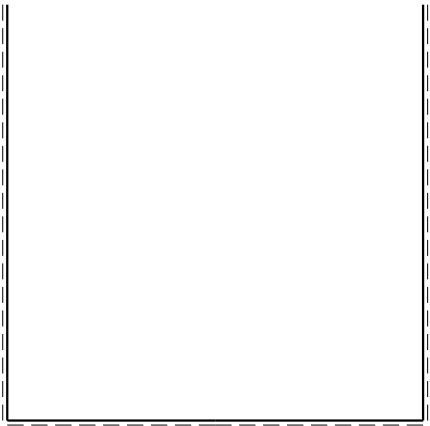
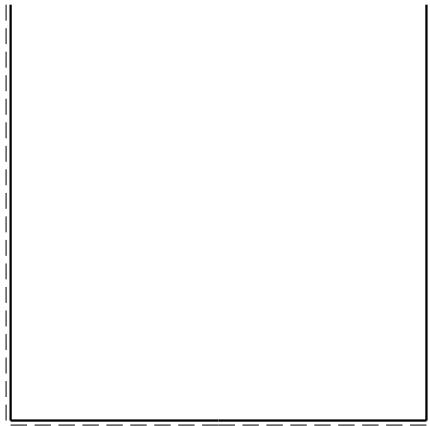
<>

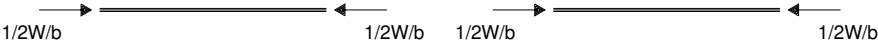
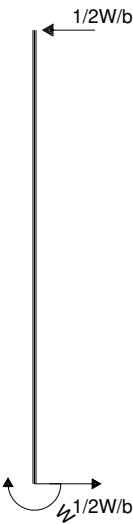
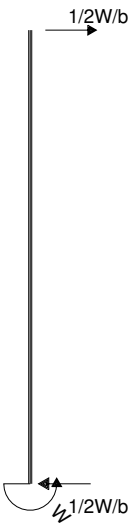
<>

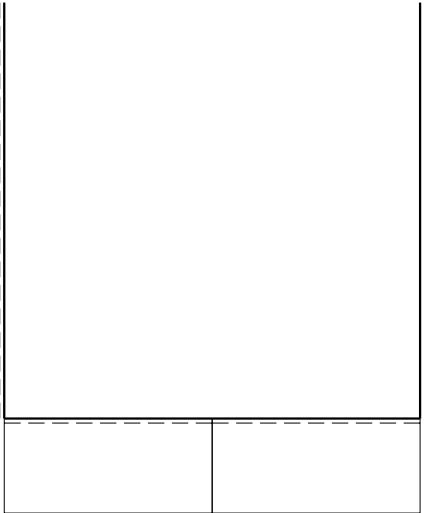
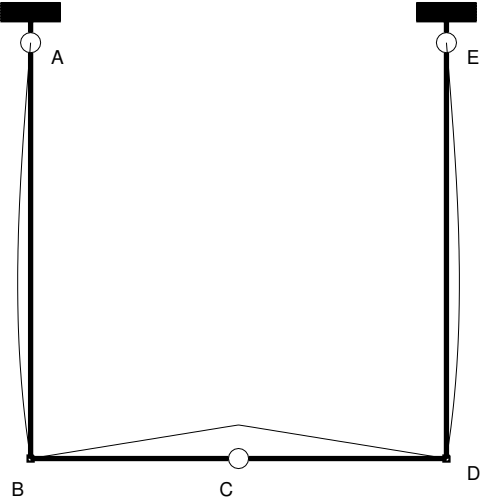
<>

<>



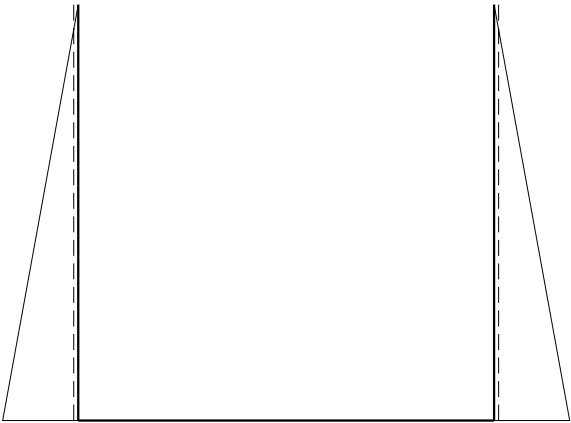
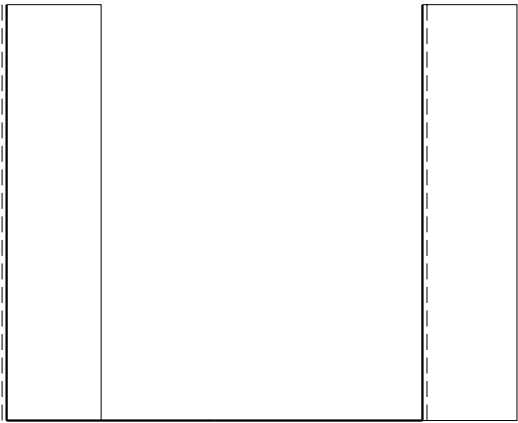






$1.5 Wb^2/EJ$

$0.4 W/b$



$0.4 W/b$

$1 W$

## REAZIONI

$$H_A = 1/2(W/b)$$

$$V_A = 0$$

$$W_C = 0$$

$$H_E = -1/2(W/b)$$

$$V_E = 0$$

$$H_{AB} = 1/2(W/b)$$

$$V_{AB} = 0$$

$$W_{AB} = 0$$

$$H_{BA} = -1/2(W/b)$$

$$V_{BA} = 0$$

$$W_{BA} = W$$

$$H_{BC} = 1/2(W/b)$$

$$V_{BC} = 0$$

$$W_{BC} = 0$$

$$H_{CB} = -1/2(W/b)$$

$$V_{CB} = 0$$

$$W_{CB} = 0$$

$$H_{CD} = 1/2(W/b)$$

$$V_{CD} = 0$$

$$W_{CD} = 0$$

$$H_{DC} = -1/2(W/b)$$

$$V_{DC} = 0$$

$$W_{DC} = 0$$

$$H_{DE} = 1/2(W/b)$$

$$V_{DE} = 0$$

$$W_{DE} = -W$$

$$H_{ED} = -1/2(W/b)$$

$$V_{ED} = 0$$

$$W_{ED} = 0$$

## SPOSTAMENTI NODALI

$$u_A = 0$$

$$v_A = 0$$

$$\phi_{AAB} = -1/3(Wb/EJ)$$

$$u_B = 0$$

$$v_B = 0$$

$$\phi_B = 2/3(Wb/EJ)$$

$$u_C = 0$$

$$v_C = 2/3(Wb^2/EJ)$$

$$\phi_C = 0$$

$$u_D = 0$$

$$v_D = 0$$

$$\phi_D = -2/3(Wb/EJ)$$

$$u_E = 0$$

$$v_E = 0$$

$$\phi_{EED} = 1/3(Wb/EJ)$$

## AZIONI INTERNE (coordinate locali)

$$N_{AB} = 0$$

$$T_{AB} = 1/2(W/b)$$

$$M_{AB} = 1/2(W/b)x$$

$$N_{BC} = -1/2(W/b)$$

$$T_{BC} = 0$$

$$M_{BC} = 0$$

$$N_{CD} = -1/2(W/b)$$

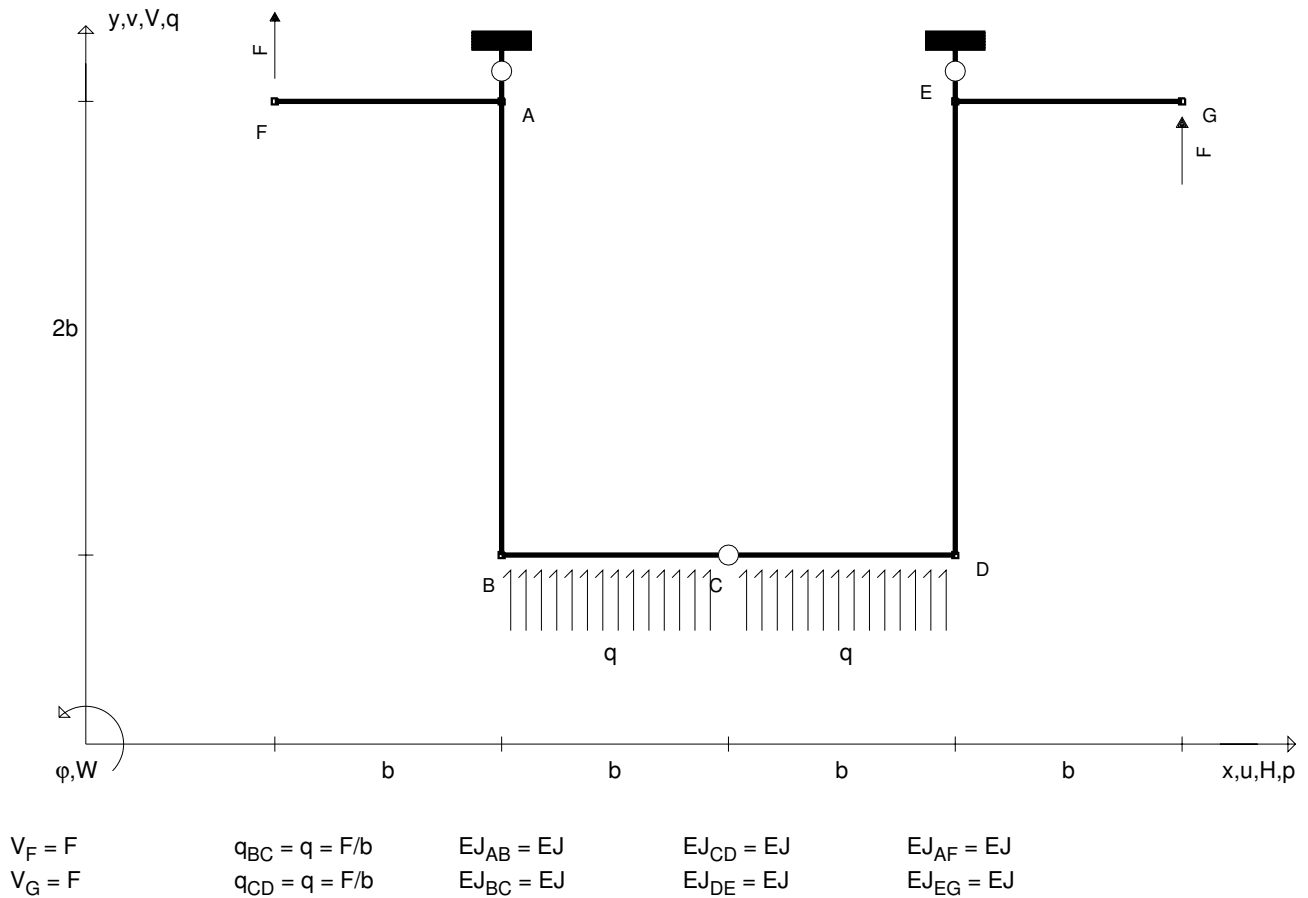
$$T_{CD} = 0$$

$$M_{CD} = 0$$

$$N_{DE} = 0$$

$$T_{DE} = -1/2(W/b)$$

$$M_{DE} = W - 1/2(W/b)x$$



Verso effettivo dei carichi riportato nel disegno.

Calcolare reazioni vincolari della struttura e delle aste.

Tracciare i diagrammi delle azioni interne nelle aste.

Esprimere le funzioni delle azioni interne nelle aste.

Calcolare spostamento e rotazione di tutti i nodi.

$u_A$   $v_A$   $\phi_A$  spostamento assoluto del nodo A.

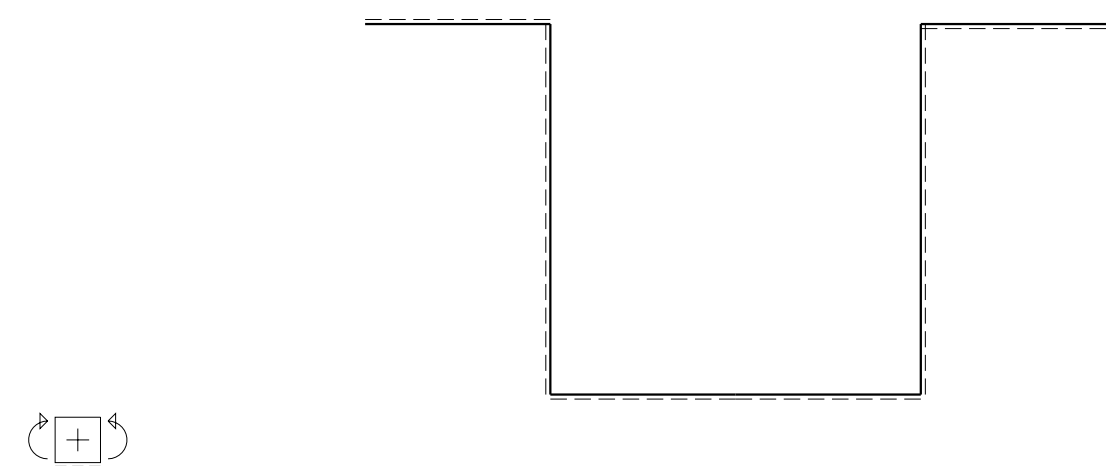
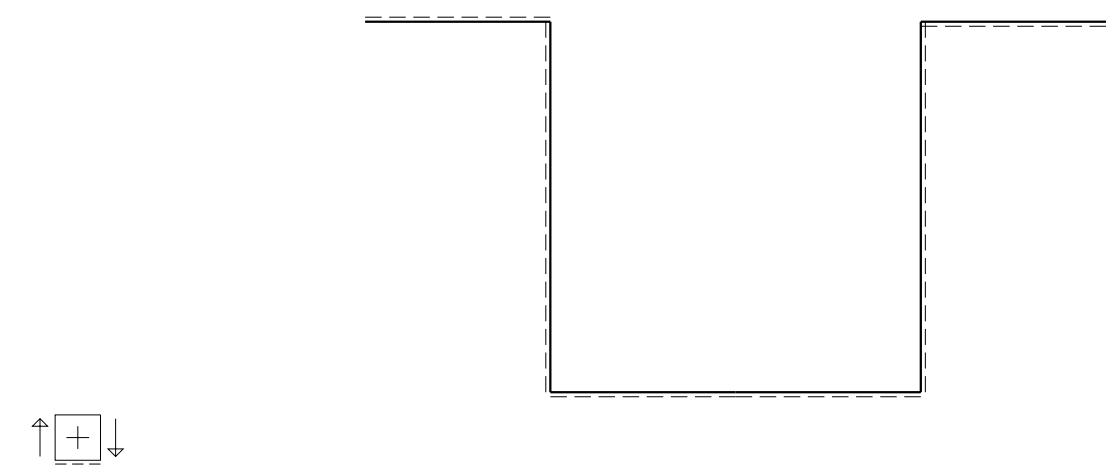
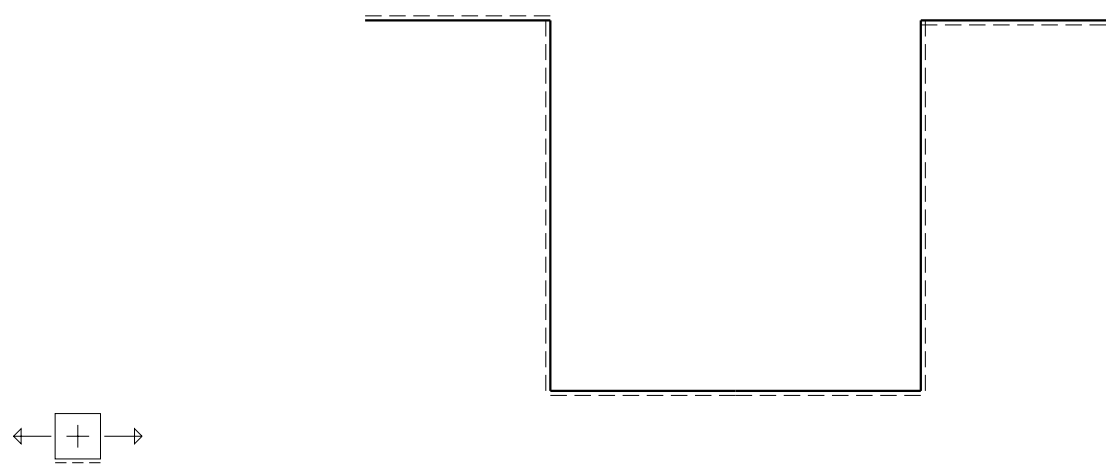
$J_{AB}$   $x_{AB}$   $\psi_{AB}$  riferimento locale asta AB con origine in A.

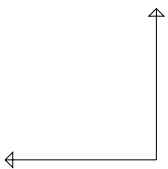
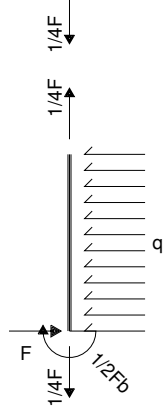
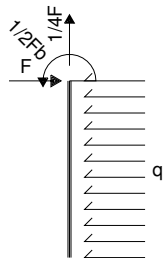
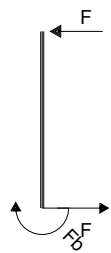
<>

<>

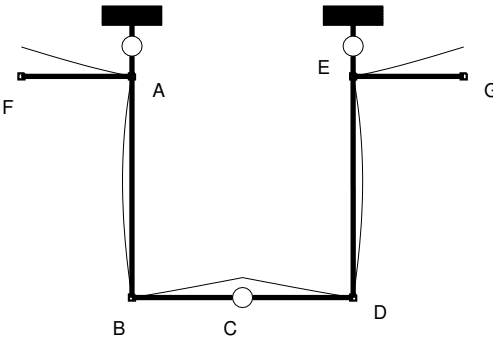
<>


<>






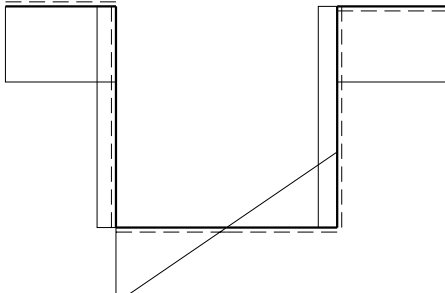
  
 $3 Fb^3/EJ$




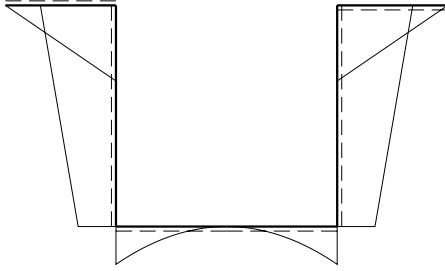
  
 $1 F$



  
 $1 F$



  
 $1 Fb$





## REAZIONI

$$H_A = -1/2F + 1/4qb = -1/4F$$

$$V_A = -F - qb = -2F$$

$$W_C = 0$$

$$H_E = 1/2F - 1/4qb = 1/4F$$

$$V_E = -F - qb = -2F$$

$$H_{AB} = -1/2F + 1/4qb = -1/4F$$

$$V_{AB} = -qb = -F$$

$$W_{AB} = -Fb = -Fb$$

$$H_{BA} = 1/2F - 1/4qb = 1/4F$$

$$V_{BA} = qb = F$$

$$W_{BA} = 1/2qb^2 = 1/2Fb$$

$$H_{BC} = -1/2F + 1/4qb = -1/4F$$

$$V_{BC} = -qb = -F$$

$$W_{BC} = -1/2qb^2 = -1/2Fb$$

$$H_{CB} = 1/2F - 1/4qb = 1/4F$$

$$V_{CB} = 0$$

$$W_{CB} = 0$$

$$H_{CD} = -1/2F + 1/4qb = -1/4F$$

$$V_{CD} = 0$$

$$W_{CD} = 0$$

$$H_{DC} = 1/2F - 1/4qb = 1/4F$$

$$V_{DC} = -qb = -F$$

$$W_{DC} = 1/2qb^2 = 1/2Fb$$

$$H_{DE} = -1/2F + 1/4qb = -1/4F$$

$$V_{DE} = qb = F$$

$$W_{DE} = -1/2qb^2 = -1/2Fb$$

$$H_{ED} = 1/2F - 1/4qb = 1/4F$$

$$V_{ED} = -qb = -F$$

$$W_{ED} = Fb = Fb$$

$$H_{AF} = 0$$

$$V_{AF} = -F = -F$$

$$W_{AF} = Fb = Fb$$

$$H_{FA} = 0$$

$$V_{FA} = F = F$$

$$W_{FA} = 0$$

$$H_{EG} = 0$$

$$V_{EG} = -F = -F$$

$$W_{EG} = -Fb = -Fb$$

$$H_{GE} = 0$$

$$V_{GE} = F = F$$

$$W_{GE} = 0$$

## SPOSTAMENTI NODALI

$$u_A = 0$$

$$v_A = 0$$

$$\varphi_A = -2/3(Fb^2/EJ) - 1/6(qb^3/EJ) = -5/6(Fb^2/EJ)$$

$$u_B = 0$$

$$v_B = 0$$

$$\varphi_B = 1/3(Fb^2/EJ) + 1/3(qb^3/EJ) = 2/3(Fb^2/EJ)$$

$$u_C = 0$$

$$v_C = 1/3(Fb^3/EJ) + 11/24(qb^4/EJ) = 19/24(Fb^3/EJ)$$

$$\varphi_C = 0$$

$$u_D = 0$$

$$v_D = 0$$

$$\varphi_D = -1/3(Fb^2/EJ) - 1/3(qb^3/EJ) = -2/3(Fb^2/EJ)$$

$$u_E = 0$$

$$v_E = 0$$

$$\varphi_E = 2/3(Fb^2/EJ) + 1/6(qb^3/EJ) = 5/6(Fb^2/EJ)$$

$$u_F = 0$$

$$v_F = (Fb^3/EJ) + 1/6(qb^4/EJ) = 7/6(Fb^3/EJ)$$

$$\varphi_F = -7/6(Fb^2/EJ) - 1/6(qb^3/EJ) = -4/3(Fb^2/EJ)$$

$$u_G = 0$$

$$v_G = (Fb^3/EJ) + 1/6(qb^4/EJ) = 7/6(Fb^3/EJ)$$

$$\varphi_G = 7/6(Fb^2/EJ) + 1/6(qb^3/EJ) = 4/3(Fb^2/EJ)$$

## AZIONI INTERNE (coordinate locali)

$$N_{AB} = -F$$

$$T_{AB} = -1/4F$$

$$M_{AB} = Fb - 1/4Fx$$

$$N_{BC} = 1/4F$$

$$T_{BC} = -F + qx$$

$$M_{BC} = 1/2Fb - Fx + 1/2qx^2$$

$$N_{CD} = 1/4F$$

$$T_{CD} = qx$$

$$M_{CD} = 1/2qx^2$$

$$N_{DE} = -F$$

$$T_{DE} = 1/4F$$

$$M_{DE} = 1/2Fb + 1/4Fx$$

$$N_{AF} = 0$$

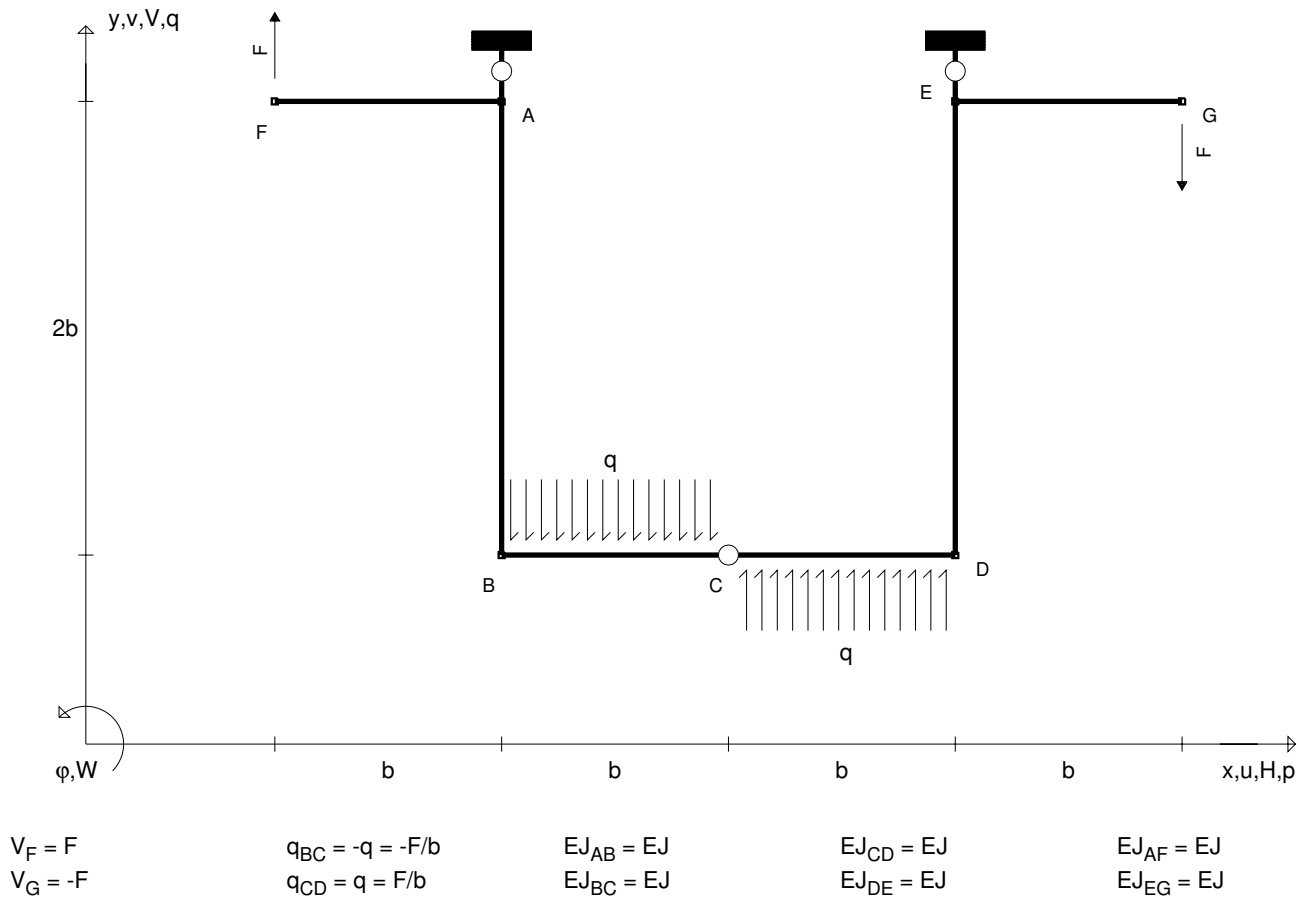
$$T_{AF} = F$$

$$M_{AF} = -Fb + Fx$$

$$N_{EG} = 0$$

$$T_{EG} = -F$$

$$M_{EG} = Fb - Fx$$



Verso effettivo dei carichi riportato nel disegno.

Calcolare reazioni vincolari della struttura e delle aste.

Tracciare i diagrammi delle azioni interne nelle aste.

Esprimere le funzioni delle azioni interne nelle aste.

Calcolare spostamento e rotazione di tutti i nodi.

$u_A$   $v_A$   $\phi_A$  spostamento assoluto del nodo A.

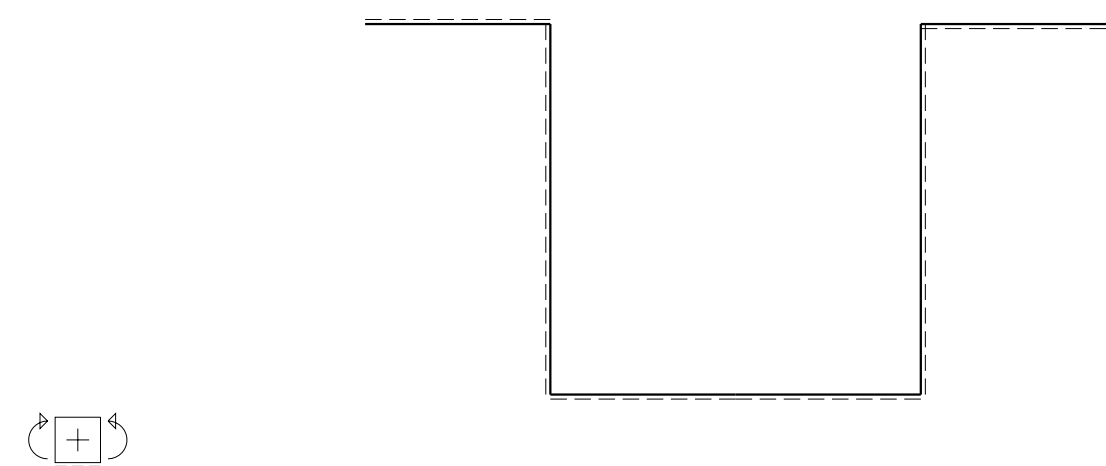
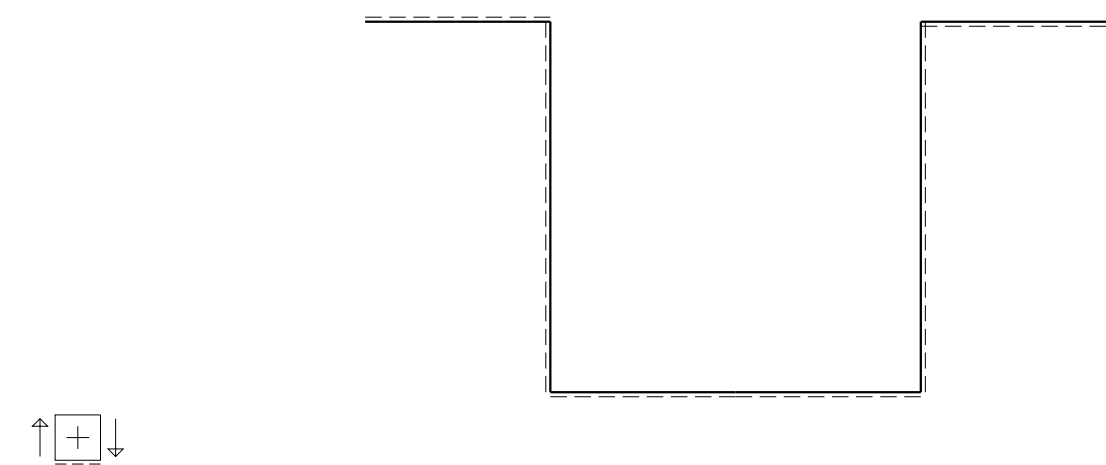
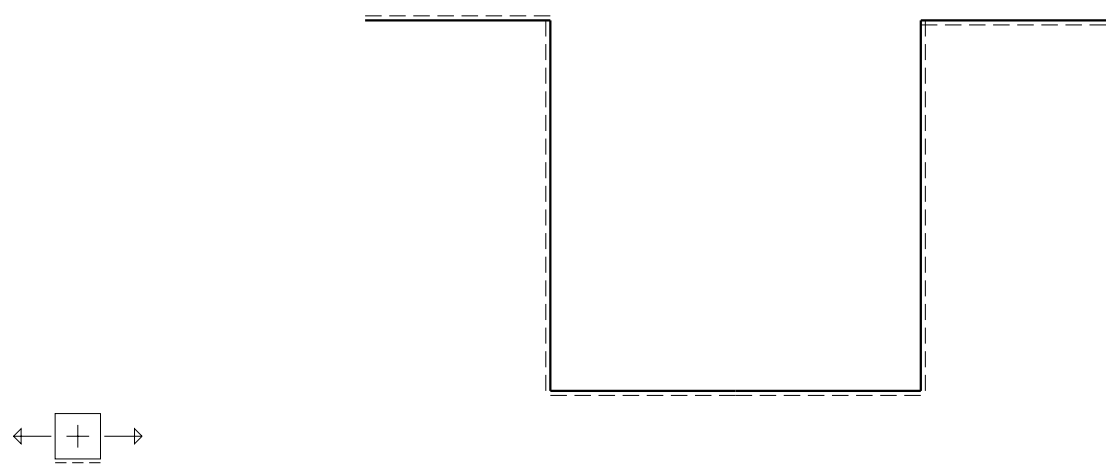
$J_{AB}$   $x_{AB}$   $\vartheta_{AB}$  riferimento locale asta AB con origine in A.

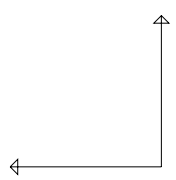
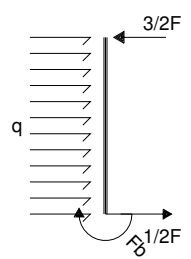
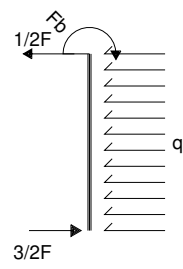
<>

<>

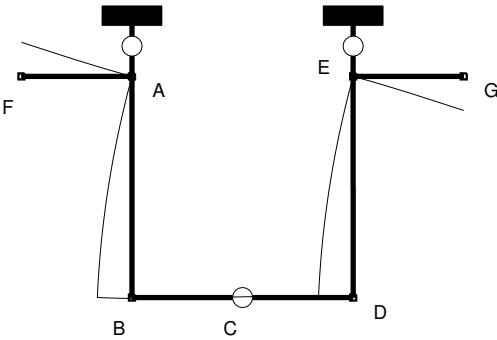
<>

<>

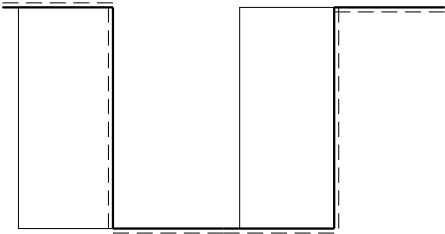




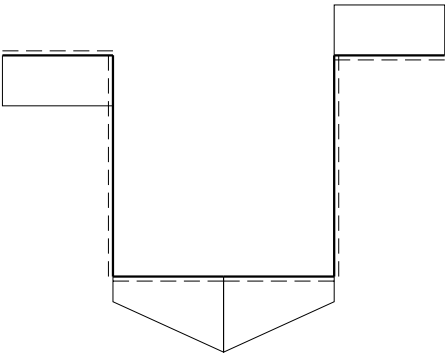
$6 Fb^3/EJ$



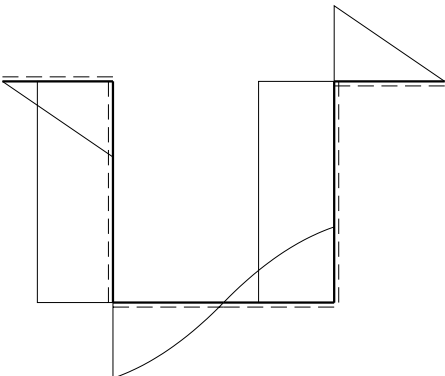
$0.4 F$



$1.5 F$



$1 Fb$



REAZIONI

$$\begin{aligned} H_A &= 0 \\ V_A &= -2F + 1/2qb = -3/2F \\ W_C &= 0 \\ H_E &= 0 \\ V_E &= 2F - 1/2qb = 3/2F \end{aligned}$$

$$\begin{aligned} H_{AB} &= 0 \\ V_{AB} &= -F + 1/2qb = -1/2F \\ W_{AB} &= -Fb = -Fb \\ H_{BA} &= 0 \\ V_{BA} &= F - 1/2qb = 1/2F \\ W_{BA} &= Fb = Fb \end{aligned}$$

$$\begin{aligned} H_{BC} &= 0 \\ V_{BC} &= -F + 1/2qb = -1/2F \\ W_{BC} &= -Fb = -Fb \\ H_{CB} &= 0 \\ V_{CB} &= F + 1/2qb = 3/2F \\ W_{CB} &= 0 \end{aligned}$$

$$\begin{aligned} H_{CD} &= 0 \\ V_{CD} &= -F - 1/2qb = -3/2F \\ W_{CD} &= 0 \\ H_{DC} &= 0 \\ V_{DC} &= F - 1/2qb = 1/2F \\ W_{DC} &= -Fb = -Fb \end{aligned}$$

$$\begin{aligned} H_{DE} &= 0 \\ V_{DE} &= -F + 1/2qb = -1/2F \\ W_{DE} &= Fb = Fb \\ H_{ED} &= 0 \\ V_{ED} &= F - 1/2qb = 1/2F \\ W_{ED} &= -Fb = -Fb \end{aligned}$$

$$\begin{aligned} H_{AF} &= 0 \\ V_{AF} &= -F = -F \\ W_{AF} &= Fb = Fb \\ H_{FA} &= 0 \\ V_{FA} &= F = F \\ W_{FA} &= 0 \end{aligned}$$

$$\begin{aligned} H_{EG} &= 0 \\ V_{EG} &= F = F \\ W_{EG} &= Fb = Fb \\ H_{GE} &= 0 \\ V_{GE} &= -F = -F \\ W_{GE} &= 0 \end{aligned}$$

SPOSTAMENTI NODALI

$$\begin{aligned} u_A &= 0 \\ v_A &= 0 \\ \varphi_A &= -7/3(Fb^2/EJ) - 1/24(qb^3/EJ) = -19/8(Fb^2/EJ) \end{aligned}$$

$$\begin{aligned} u_B &= -8/3(Fb^3/EJ) - 1/12(qb^4/EJ) = -11/4(Fb^3/EJ) \\ v_B &= 0 \\ \varphi_B &= -1/3(Fb^2/EJ) - 1/24(qb^3/EJ) = -3/8(Fb^2/EJ) \end{aligned}$$

$$\begin{aligned} u_C &= -8/3(Fb^3/EJ) - 1/12(qb^4/EJ) = -11/4(Fb^3/EJ) \\ v_C &= 0 \\ \varphi_C &= 0 \end{aligned}$$

$$\begin{aligned} u_D &= -8/3(Fb^3/EJ) - 1/12(qb^4/EJ) = -11/4(Fb^3/EJ) \\ v_D &= 0 \\ \varphi_D &= -1/3(Fb^2/EJ) - 1/24(qb^3/EJ) = -3/8(Fb^2/EJ) \end{aligned}$$

$$\begin{aligned} u_E &= 0 \\ v_E &= 0 \\ \varphi_E &= -7/3(Fb^2/EJ) - 1/24(qb^3/EJ) = -19/8(Fb^2/EJ) \end{aligned}$$

$$\begin{aligned} u_F &= 0 \\ v_F &= 8/3(Fb^3/EJ) + 1/24(qb^4/EJ) = 65/24(Fb^3/EJ) \\ \varphi_F &= -17/6(Fb^2/EJ) - 1/24(qb^3/EJ) = -23/8(Fb^2/EJ) \end{aligned}$$

$$\begin{aligned} u_G &= 0 \\ v_G &= -8/3(Fb^3/EJ) - 1/24(qb^4/EJ) = -65/24(Fb^3/EJ) \\ \varphi_G &= -17/6(Fb^2/EJ) - 1/24(qb^3/EJ) = -23/8(Fb^2/EJ) \end{aligned}$$

AZIONI INTERNE (coordinate locali)

$$\begin{aligned} N_{AB} &= -1/2F \\ T_{AB} &= 0 \\ M_{AB} &= Fb \end{aligned}$$

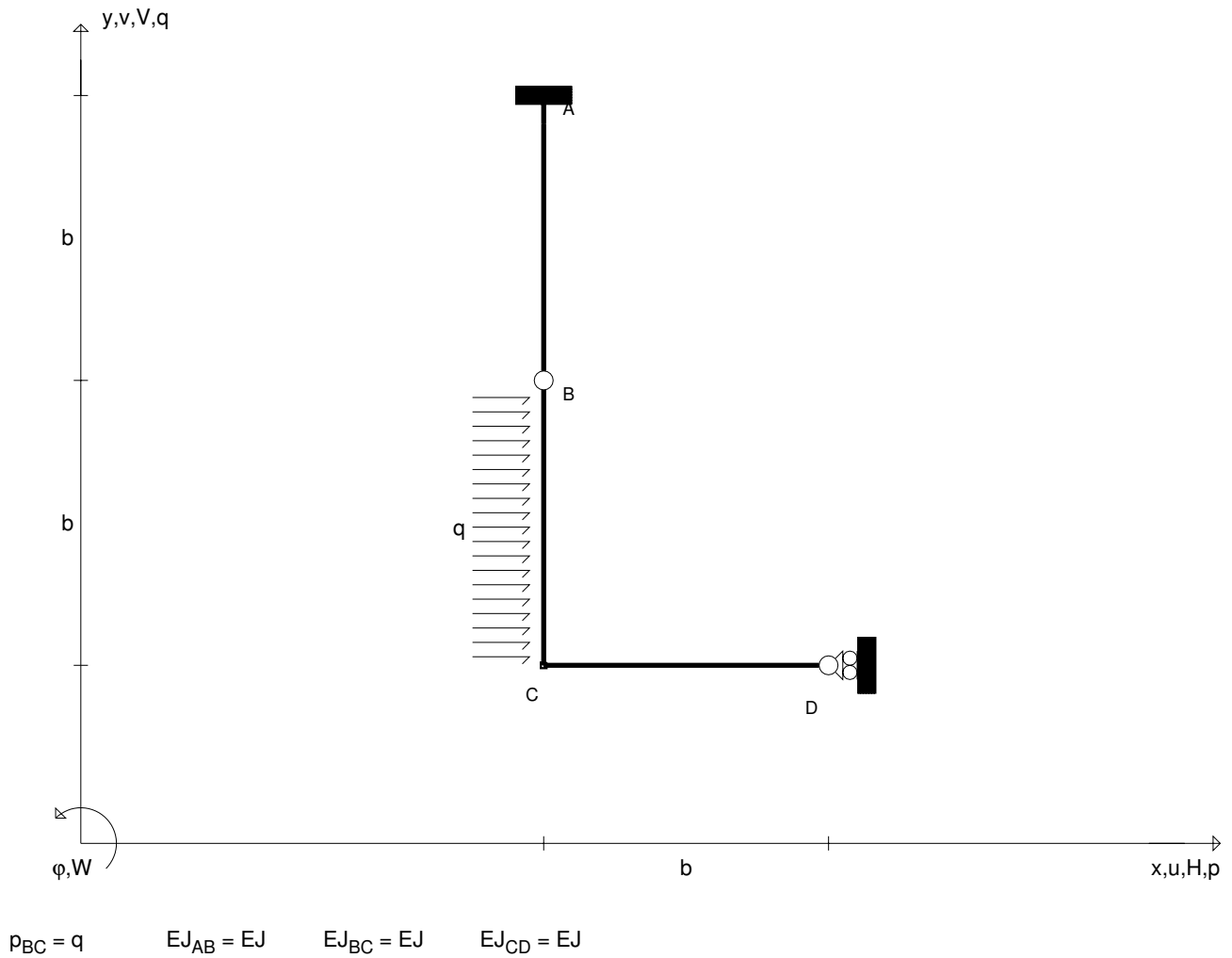
$$\begin{aligned} N_{BC} &= 0 \\ T_{BC} &= -1/2F - qx \\ M_{BC} &= Fb - 1/2Fx - 1/2qx^2 \end{aligned}$$

$$\begin{aligned} N_{CD} &= 0 \\ T_{CD} &= -3/2F + qx \\ M_{CD} &= -3/2Fx + 1/2qx^2 \end{aligned}$$

$$\begin{aligned} N_{DE} &= 1/2F \\ T_{DE} &= 0 \\ M_{DE} &= -Fb \end{aligned}$$

$$\begin{aligned} N_{AF} &= 0 \\ T_{AF} &= F \\ M_{AF} &= -Fb + Fx \end{aligned}$$

$$\begin{aligned} N_{EG} &= 0 \\ T_{EG} &= F \\ M_{EG} &= -Fb + Fx \end{aligned}$$



Verso effettivo dei carichi riportato nel disegno.

Calcolare reazioni vincolari della struttura e delle aste.

Tracciare i diagrammi delle azioni interne nelle aste.

Esprimere le funzioni delle azioni interne nelle aste.

Calcolare spostamento e rotazione di tutti i nodi.

$u_A$   $v_A$   $\phi_A$  spostamento assoluto del nodo A.

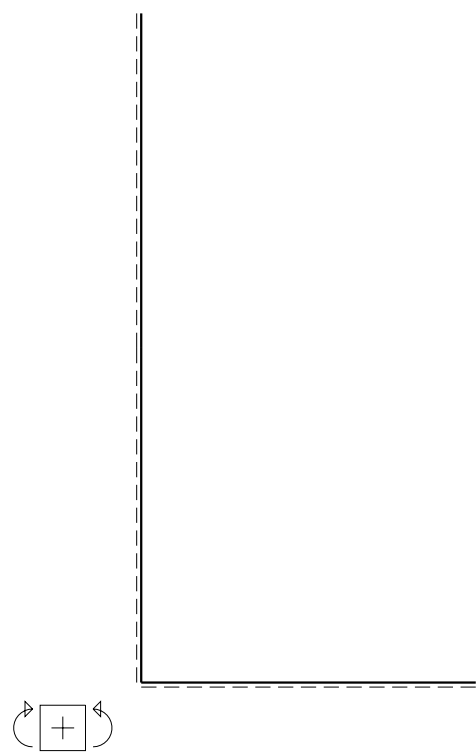
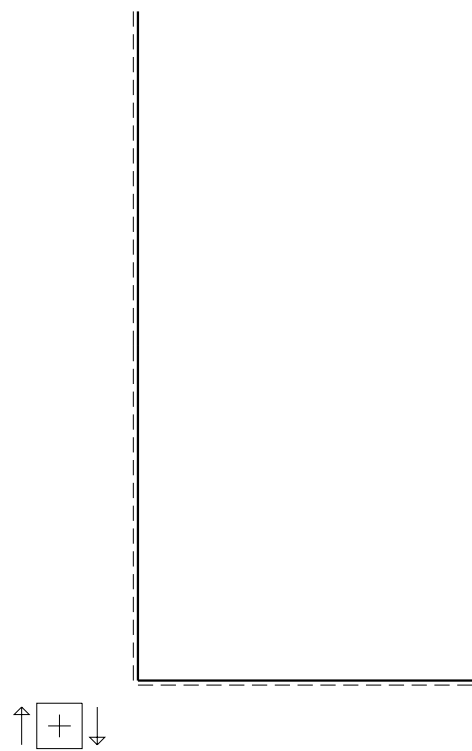
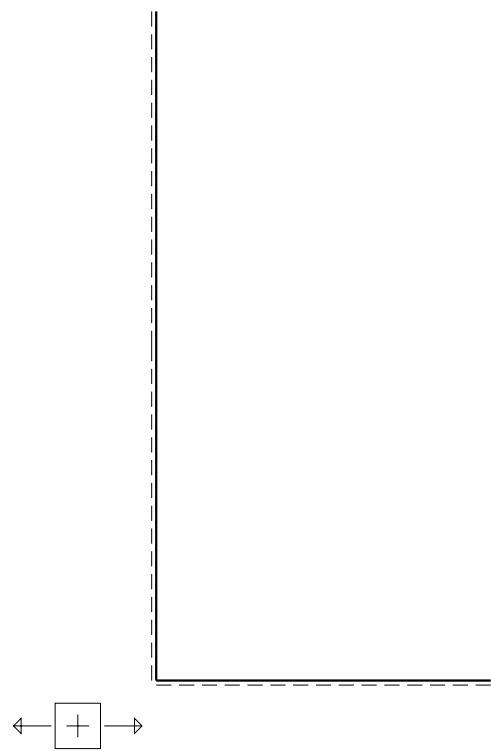
$J_{AB}$   $x_{AB}$   $\psi_{AB}$  riferimento locale asta AB con origine in A.

<>

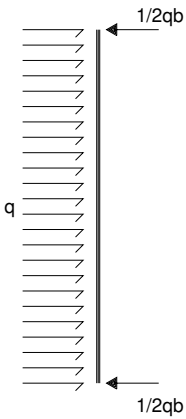
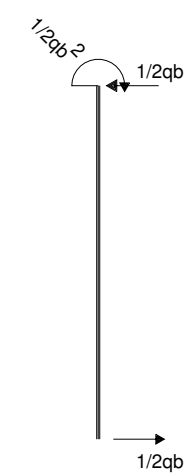
<>

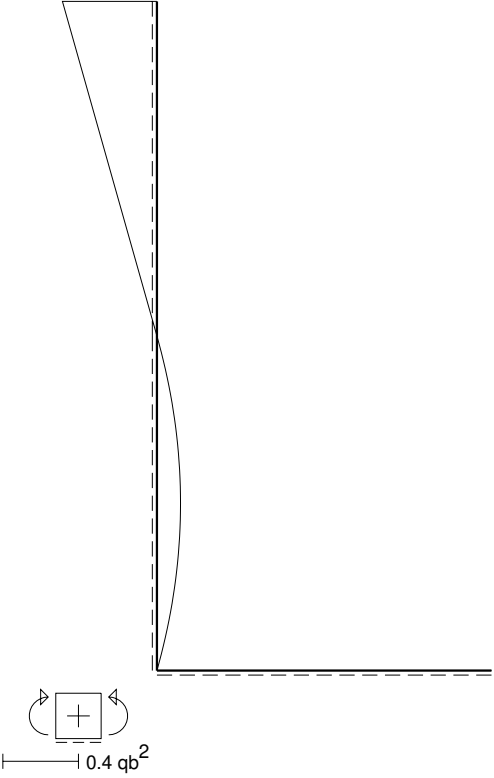
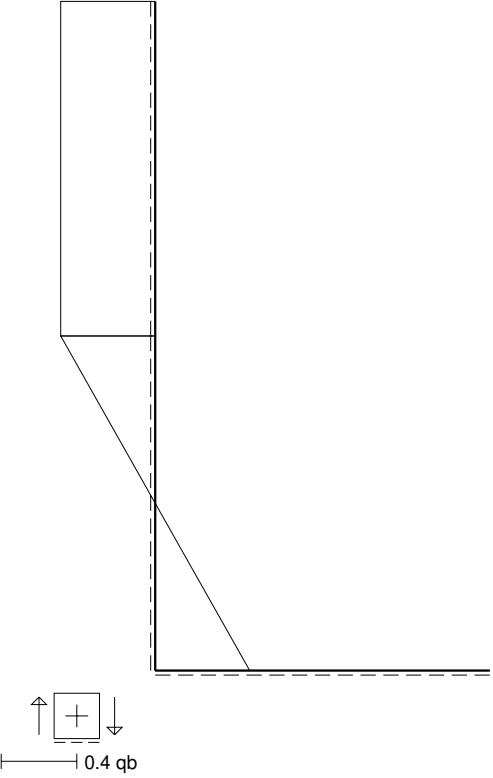
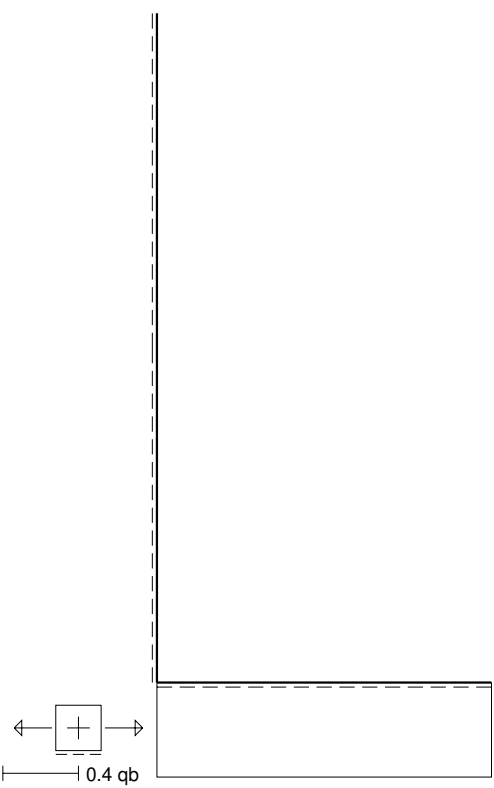
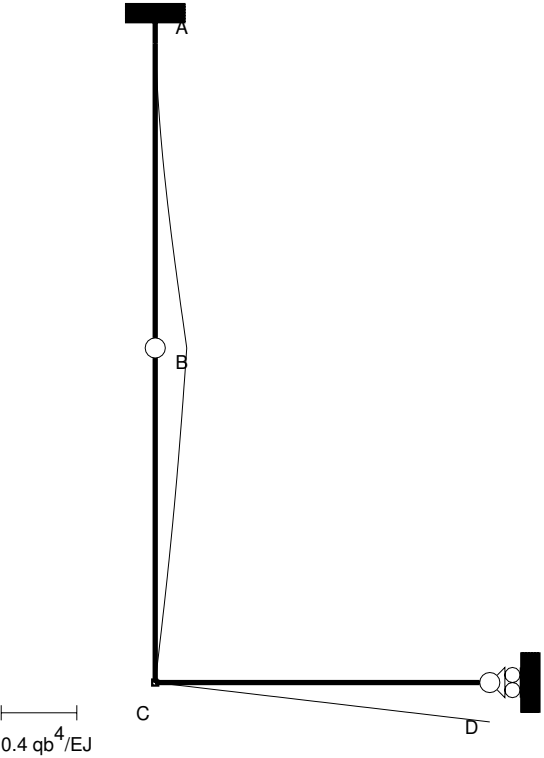
<>

<>









## REAZIONI

$$\begin{aligned}H_A &= -1/2qb \\ V_A &= 0 \\ W_A &= -1/2qb^2 \\ W_B &= 0 \\ H_D &= -1/2qb\end{aligned}$$

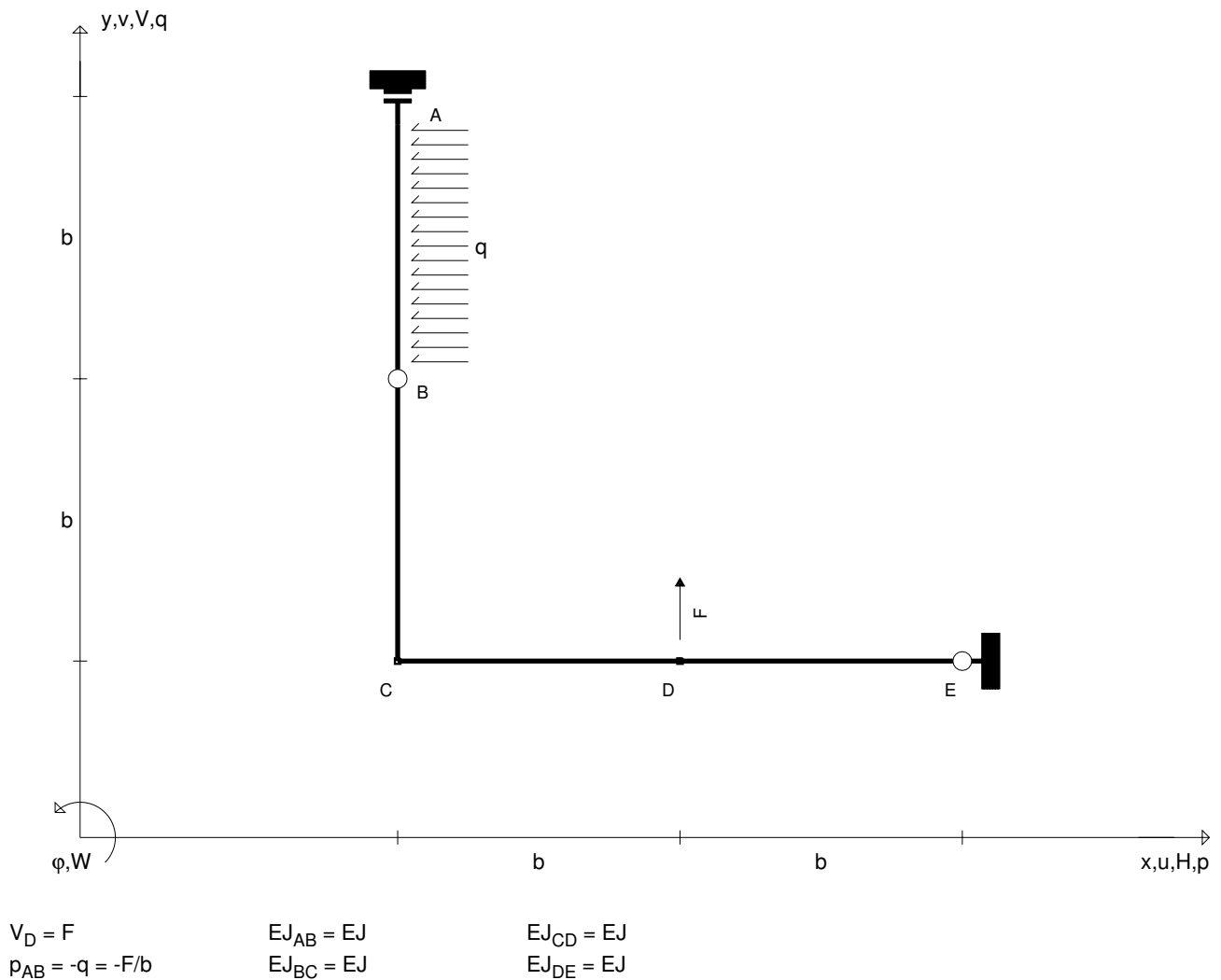
$H_{AB} = -1/2qb$	$H_{BC} = -1/2qb$	$H_{CD} = 1/2qb$
$V_{AB} = 0$	$V_{BC} = 0$	$V_{CD} = 0$
$W_{AB} = -1/2qb^2$	$W_{BC} = 0$	$W_{CD} = 0$
$H_{BA} = 1/2qb$	$H_{CB} = -1/2qb$	$H_{DC} = -1/2qb$
$V_{BA} = 0$	$V_{CB} = 0$	$V_{DC} = 0$
$W_{BA} = 0$	$W_{CB} = 0$	$W_{DC} = 0$

## SPOSTAMENTI NODALI

$u_A = 0$	$u_B = 1/6(qb^4/EJ)$	$u_C = 0$	$u_D = 0$
$v_A = 0$	$v_B = 0$	$v_C = 0$	$v_{DDC} = -5/24(qb^4/EJ)$
$\varphi_A = 0$	$\varphi_B = 0$	$\varphi_C = -5/24(qb^3/EJ)$	$\varphi_{DDC} = -5/24(qb^3/EJ)$

## AZIONI INTERNE (coordinate locali)

$N_{AB} = 0$	$N_{BC} = 0$	$N_{CD} = -1/2qb$
$T_{AB} = -1/2qb$	$T_{BC} = -1/2qb + qx$	$T_{CD} = 0$
$M_{AB} = 1/2qb^2 - 1/2qbx$	$M_{BC} = -1/2qbx + 1/2qx^2$	$M_{CD} = 0$



Verso effettivo dei carichi riportato nel disegno.

Calcolare reazioni vincolari della struttura e delle aste.

Tracciare i diagrammi delle azioni interne nelle aste.

Esprimere le funzioni delle azioni interne nelle aste.

Calcolare spostamento e rotazione di tutti i nodi.

$u_A$   $v_A$   $\varphi_A$  spostamento assoluto del nodo A.

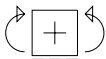
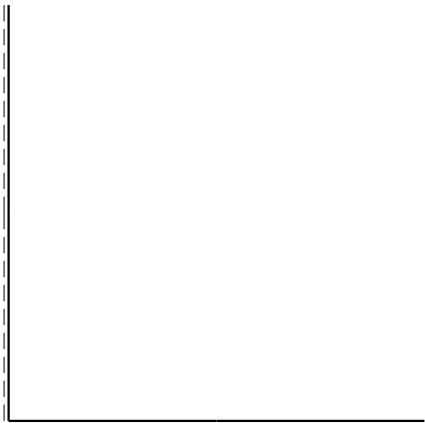
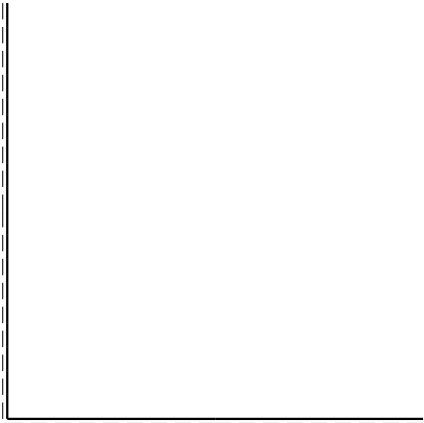
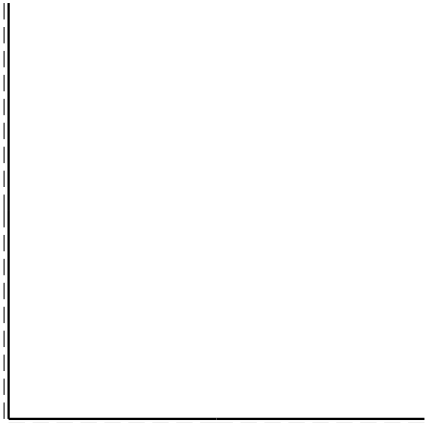
$J_{AB}$   $x_{AB}$   $\vartheta_{AB}$  riferimento locale asta AB con origine in A.

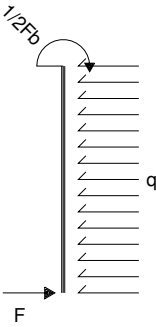
<>

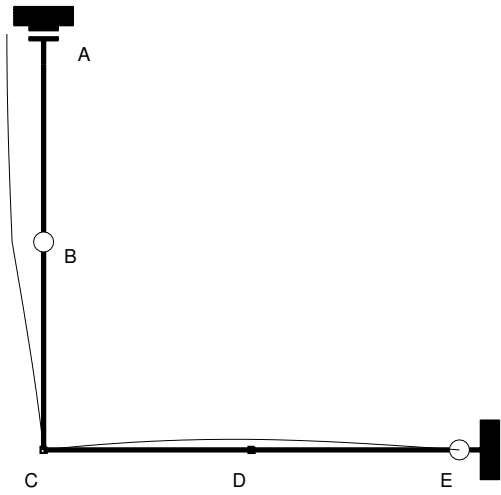
<>

<>

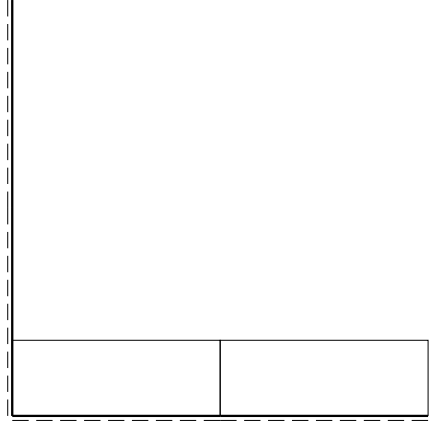
<>



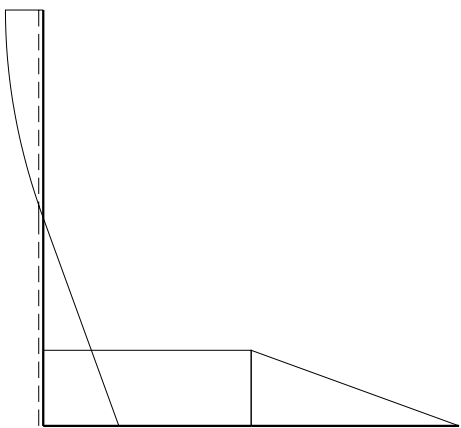
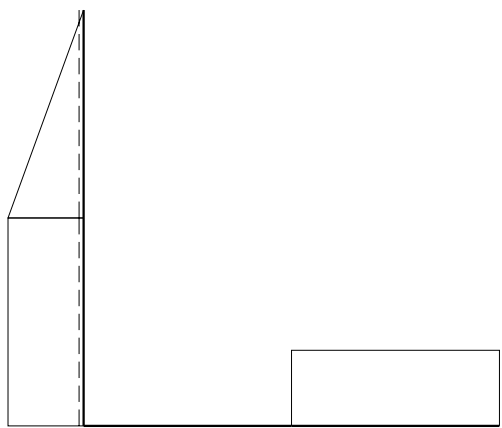




$3 Fb^3/EJ$



$1 F$



$1 F$

$1 Fb$

REAZIONI

$$\begin{aligned}V_A &= -1/2F + 1/2qb = 0 \\W_A &= -1/2qb^2 = -1/2Fb \\W_B &= 0 \\H_E &= qb = F \\V_E &= -1/2F - 1/2qb = -F\end{aligned}$$

$$\begin{aligned}H_{AB} &= 0 \\V_{AB} &= -1/2F + 1/2qb = 0 \\W_{AB} &= -1/2qb^2 = -1/2Fb \\H_{BA} &= qb = F \\V_{BA} &= 1/2F - 1/2qb = 0 \\W_{BA} &= 0\end{aligned}$$

$$\begin{aligned}H_{BC} &= -qb = -F \\V_{BC} &= -1/2F + 1/2qb = 0 \\W_{BC} &= 0 \\H_{CB} &= qb = F \\V_{CB} &= 1/2F - 1/2qb = 0 \\W_{CB} &= -qb^2 = -Fb\end{aligned}$$

$$\begin{aligned}H_{CD} &= -qb = -F \\V_{CD} &= -1/2F + 1/2qb = 0 \\W_{CD} &= qb^2 = Fb \\H_{DC} &= qb = F \\V_{DC} &= 1/2F - 1/2qb = 0 \\W_{DC} &= -1/2Fb - 1/2qb^2 = -Fb\end{aligned}$$

$$\begin{aligned}H_{DE} &= -qb = -F \\V_{DE} &= 1/2F + 1/2qb = F \\W_{DE} &= 1/2Fb + 1/2qb^2 = Fb \\H_{ED} &= qb = F \\V_{ED} &= -1/2F - 1/2qb = -F \\W_{ED} &= 0\end{aligned}$$

SPOSTAMENTI NODALI

$$\begin{aligned}u_{AAB} &= -1/4(Fb^3/EJ) - 29/24(qb^4/EJ) = -35/24(Fb^3/EJ) \\v_A &= 0 \\\varphi_A &= 0\end{aligned}$$

$$\begin{aligned}u_B &= -1/4(Fb^3/EJ) - (qb^4/EJ) = -5/4(Fb^3/EJ) \\v_B &= 0 \\\varphi_B &= 0\end{aligned}$$

$$\begin{aligned}u_C &= 0 \\v_C &= 0 \\\varphi_C &= 1/4(Fb^2/EJ) + 2/3(qb^3/EJ) = 11/12(Fb^2/EJ)\end{aligned}$$

$$\begin{aligned}u_D &= 0 \\v_D &= 1/6(Fb^3/EJ) + 1/4(qb^4/EJ) = 5/12(Fb^3/EJ) \\\varphi_D &= -1/12(qb^3/EJ) = -1/12(Fb^2/EJ)\end{aligned}$$

$$\begin{aligned}u_E &= 0 \\v_E &= 0 \\\varphi_{EED} &= -1/4(Fb^2/EJ) - 1/3(qb^3/EJ) = -7/12(Fb^2/EJ)\end{aligned}$$

AZIONI INTERNE (coordinate locali)

$$\begin{aligned}N_{AB} &= 0 \\T_{AB} &= -qx \\M_{AB} &= 1/2Fb - 1/2qx^2\end{aligned}$$

$$\begin{aligned}N_{BC} &= 0 \\T_{BC} &= -F \\M_{BC} &= -Fx\end{aligned}$$

$$\begin{aligned}N_{CD} &= F \\T_{CD} &= 0 \\M_{CD} &= -Fb\end{aligned}$$

$$\begin{aligned}N_{DE} &= F \\T_{DE} &= F \\M_{DE} &= -Fb + Fx\end{aligned}$$