

- Carichi e deformazioni date hanno verso efficace in disegno.  
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 $J_{YZ} - \delta_{YZ}$  riferimento locale asta YZ con origine in Y  
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Spostamento verticale assoluto imposto al nodo A.  
Calcolare la rotazione assoluta del nodo A su asta AB  
Svolgere l'analisi cinematica.  
Ripetere la soluzione su questo foglio.
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DEFORMATA (coordinate locali)

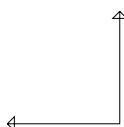
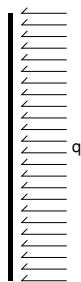
$$AB \ y(x)EJ =$$

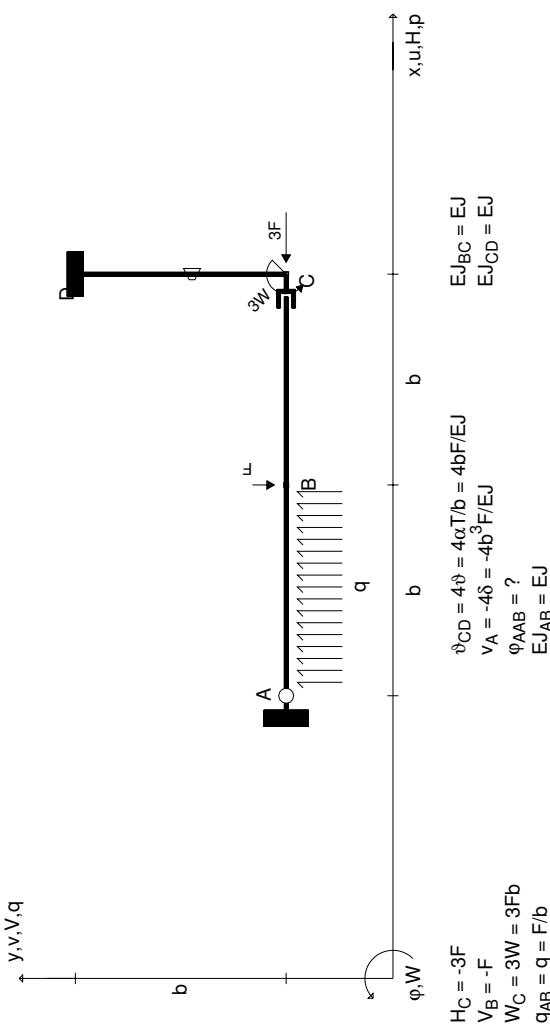
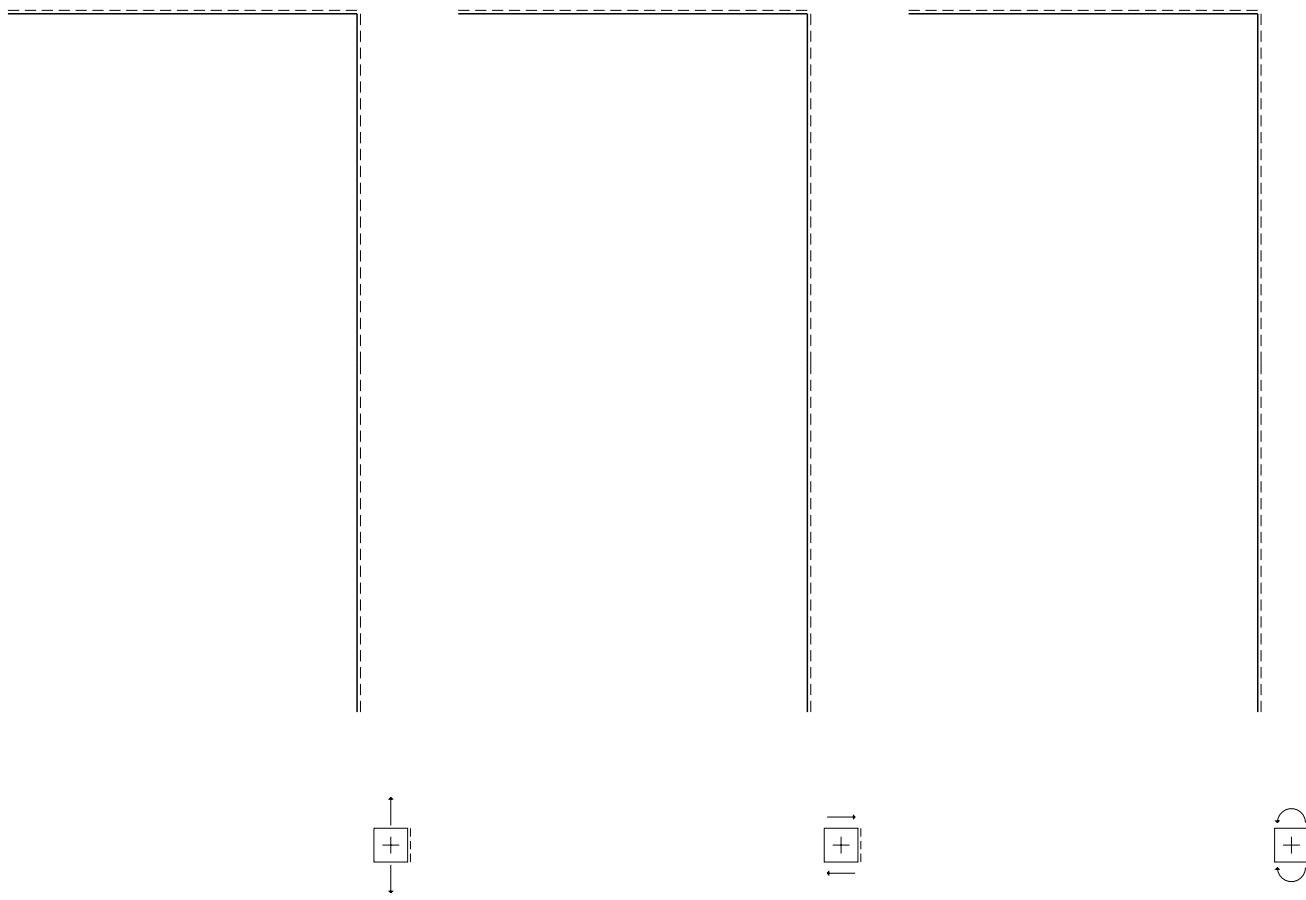
$$BC \ y(x)EJ =$$

$$CD \ y(x)EJ =$$

SPOSTAMENTI ASSOLUTI

$$\varphi_{AAB} =$$





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DEFORMATA (coordinate locali)

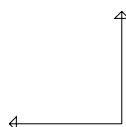
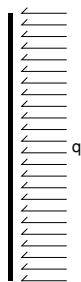
$$AB \ y(x)EJ =$$

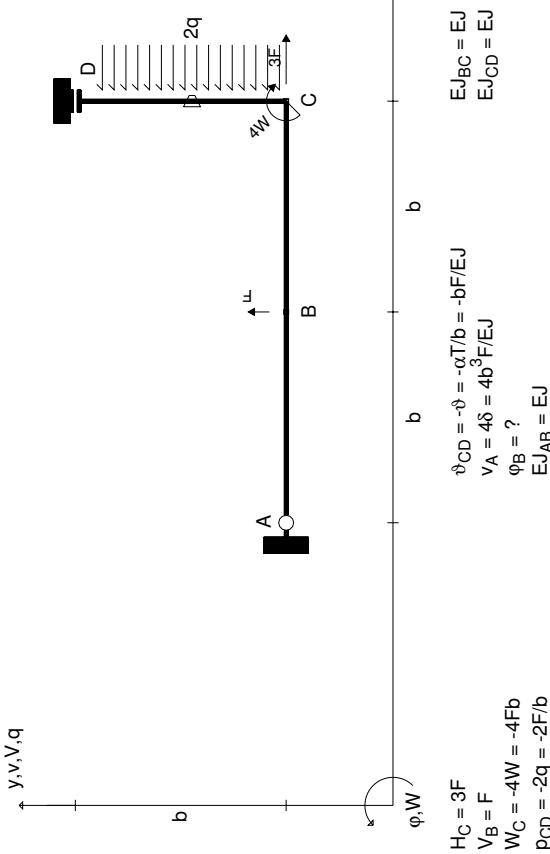
$$BC \ y(x)EJ =$$

$$CD \ y(x)EJ =$$

SPOSTAMENTI ASSOLUTI

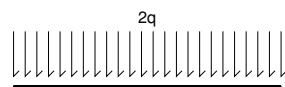
$$\varphi_{AAB} =$$





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Calcolare la rotazione assoluta del nodo B  
Svolgere l'analisi cinematica.  
Ripetere la soluzione su questo foglio.
- © Adolfo Zavelani Rossi, Politecnico di Milano





DEFORMATA (coordinate locali)

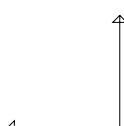
$$AB \ y(x)EJ =$$

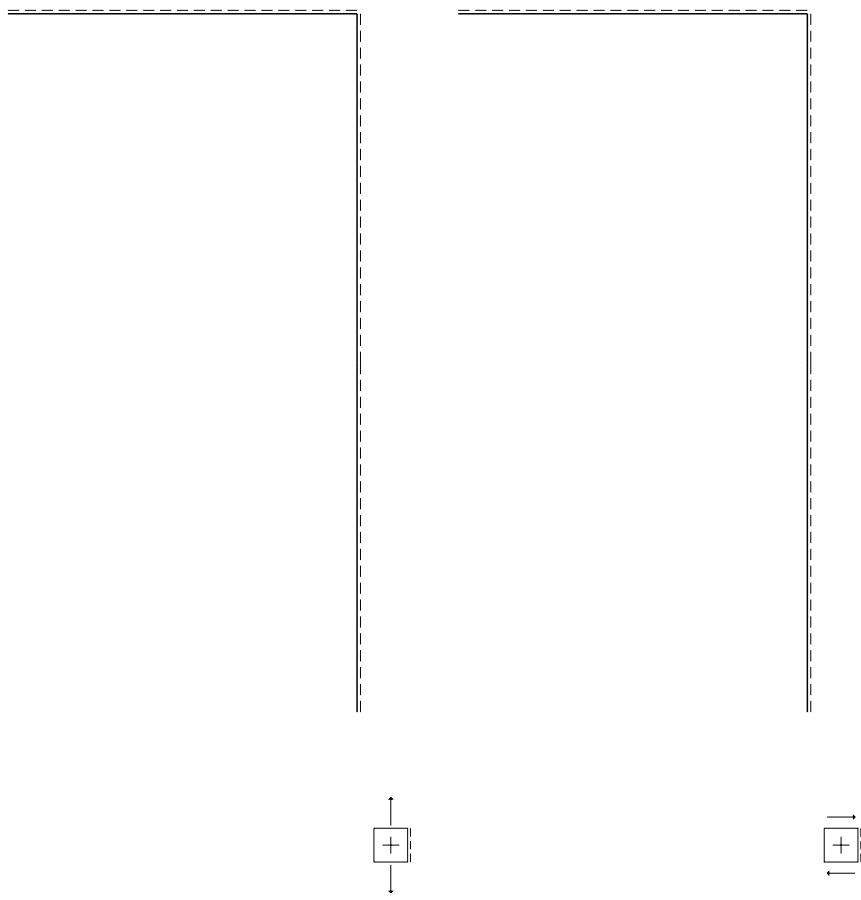
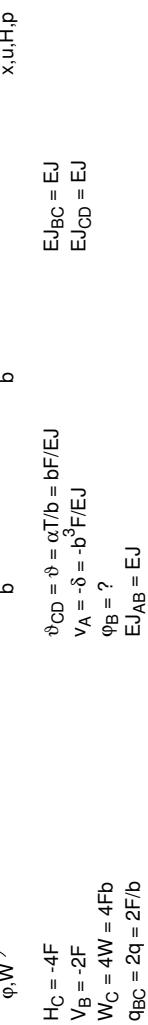
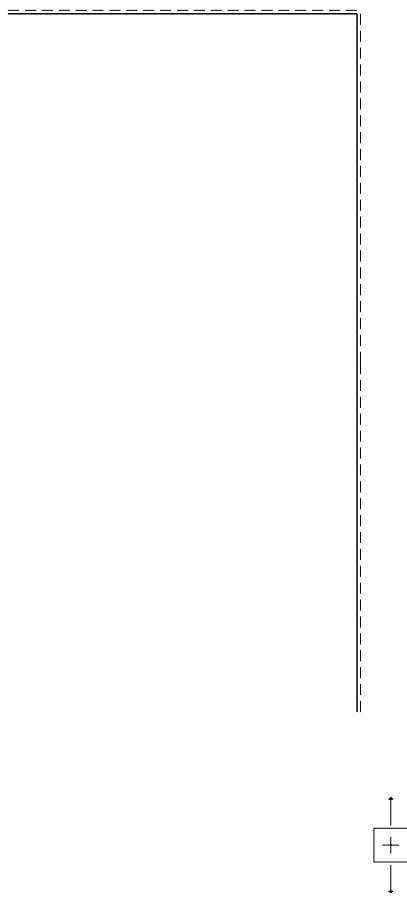
$$BC \ y(x)EJ =$$

$$CD \ y(x)EJ =$$

SPOSTAMENTI ASSOLUTI

$$\phi_B =$$





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DEFORMATA (coordinate locali)

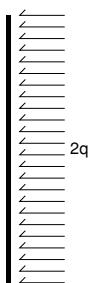
$$AB \ y(x)EJ =$$

$$BC \ y(x)EJ =$$

$$CD \ y(x)EJ =$$

## SPOSTAMENTI ASSOLUTI

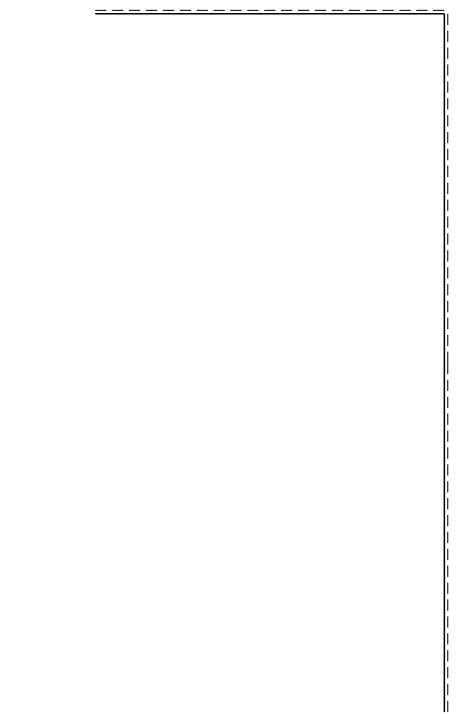
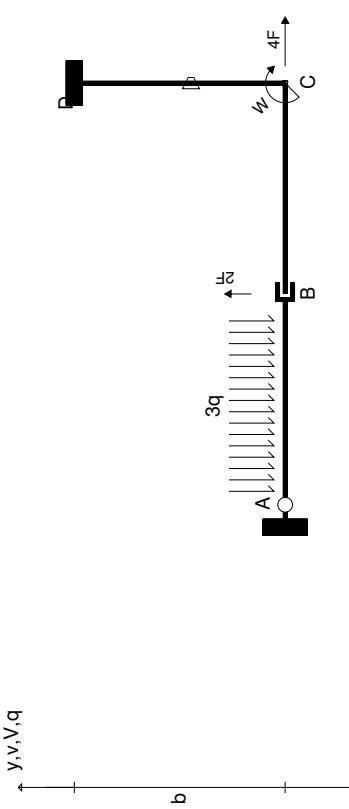
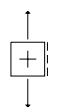
$$\phi_B =$$





$$\begin{aligned} H_C &= 4F \\ V_B &= 2F \\ W_C &= -W = -Fb \\ q_{AB} &= -3q = -3F/b \end{aligned}$$

$$\begin{aligned} \vartheta_{CD} &= -2\delta = -2\alpha T/b = -2bF/EJ \\ v_A &= \delta = b^3 F/EJ \\ \varphi_{AAB} &= ? \\ EJ_{AB} &= EJ \end{aligned}$$



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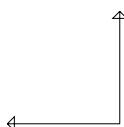
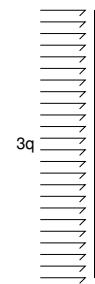


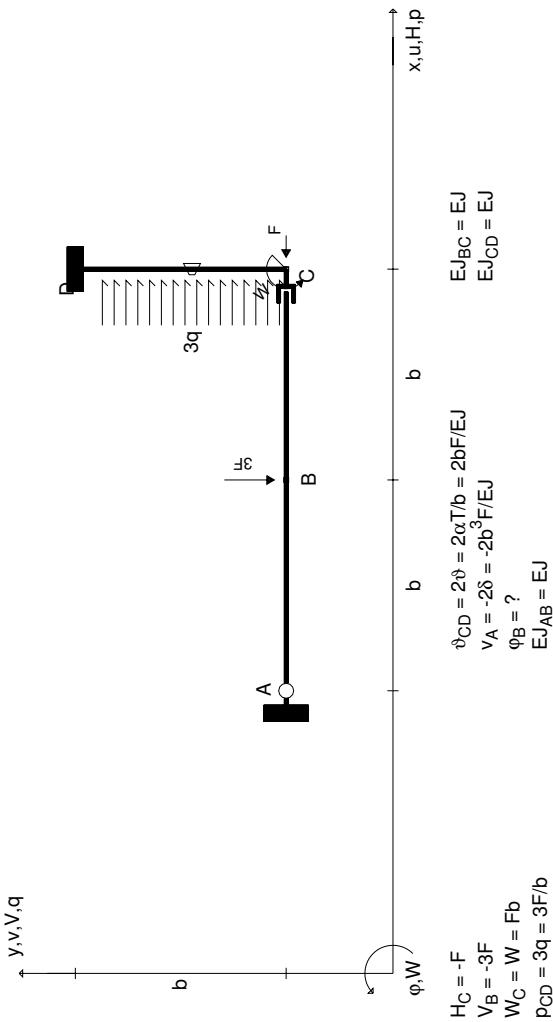
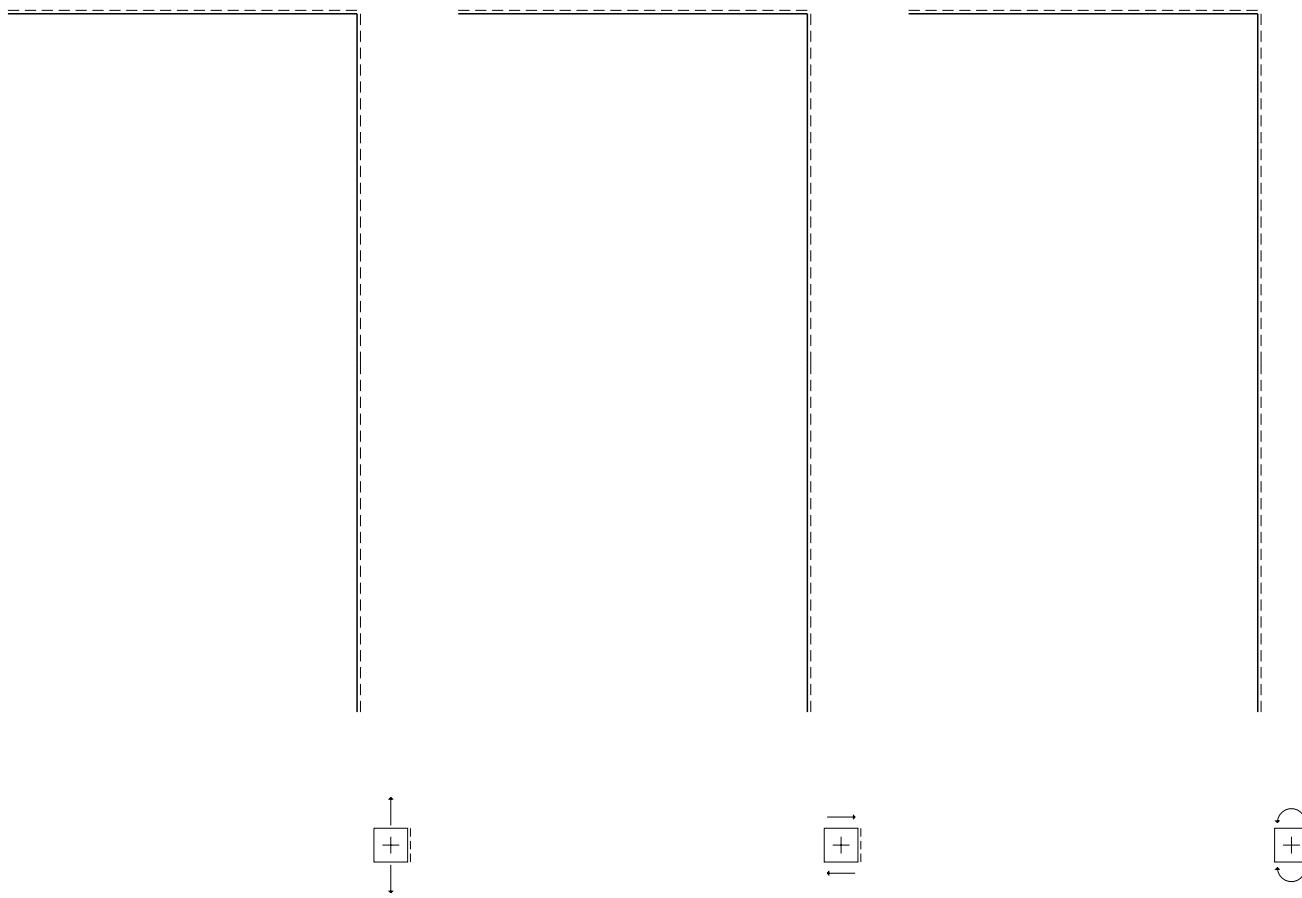


DEFORMATA (coordinate locali)

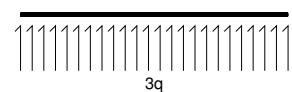
AB  $y(x)EJ =$ BC  $y(x)EJ =$ CD  $y(x)EJ =$ 

SPOSTAMENTI ASSOLUTI

 $\varphi_{AAB} =$ 



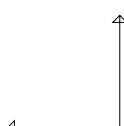
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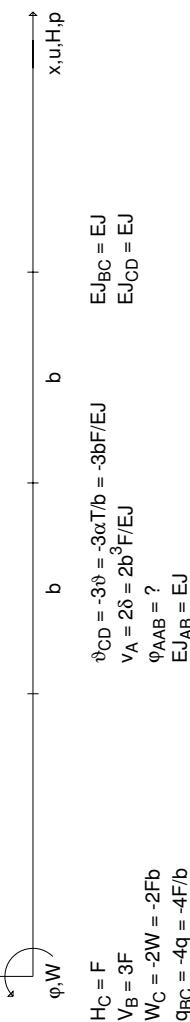
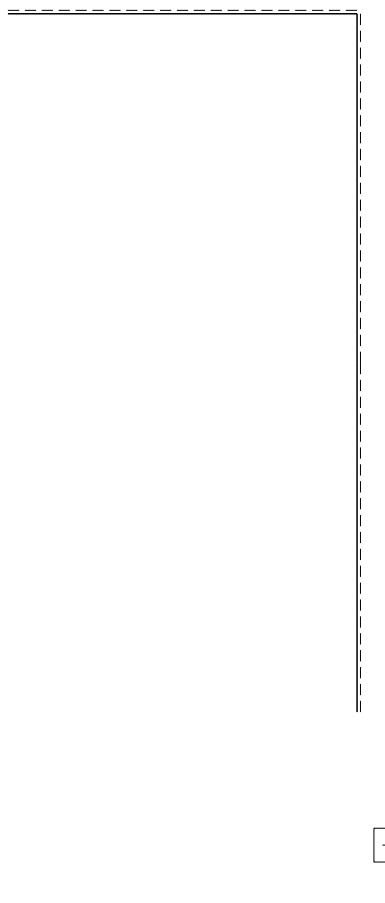


DEFORMATA (coordinate locali)

AB  $y(x)EJ =$ BC  $y(x)EJ =$ CD  $y(x)EJ =$ 

SPOSTAMENTI ASSOLUTI

 $\phi_B =$ 



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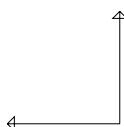
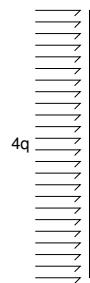


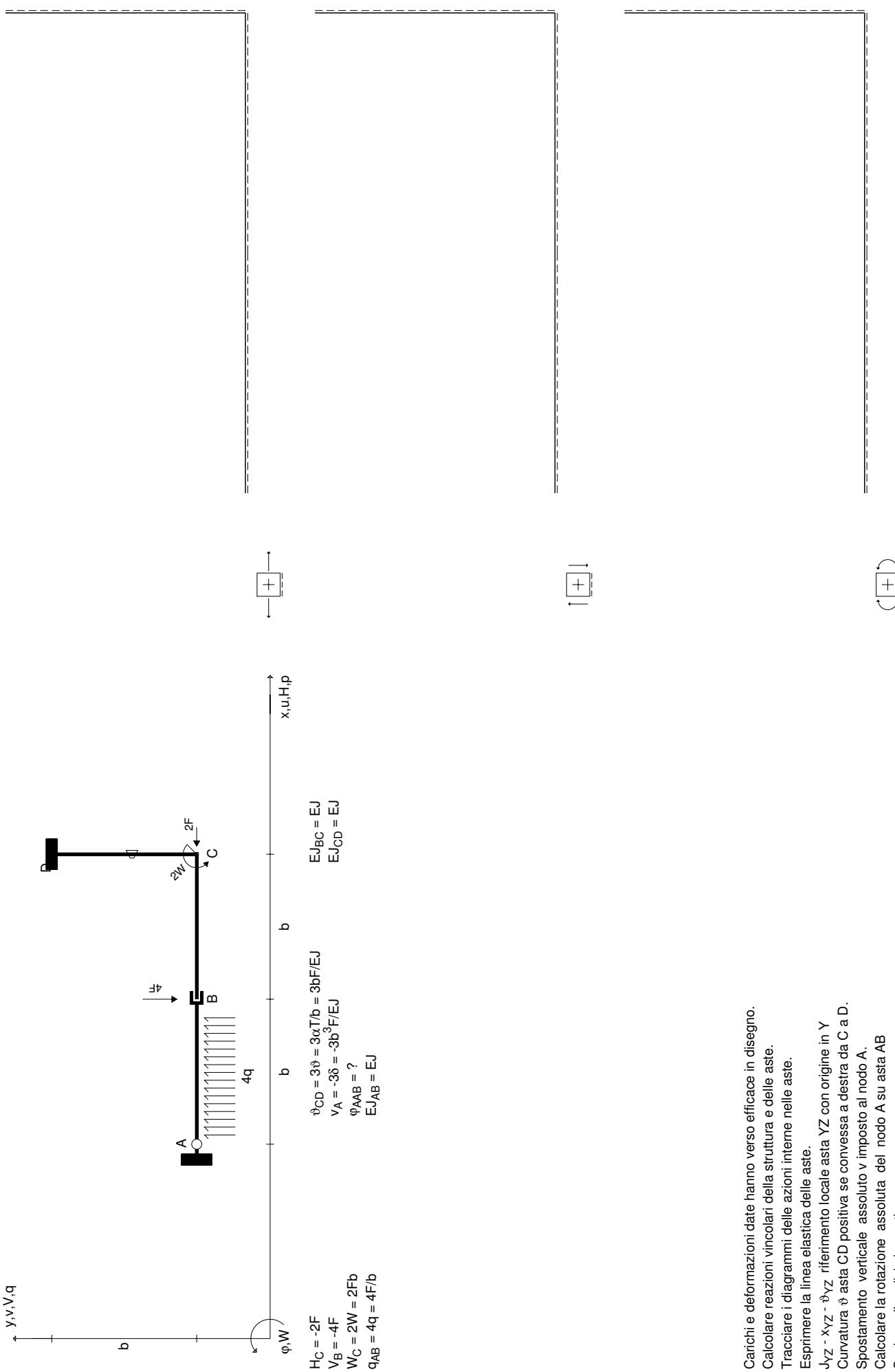


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SPOSTAMENTI ASSOLUTI

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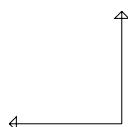
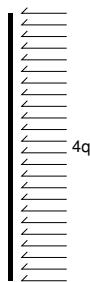
$$AB \ y(x)EJ =$$

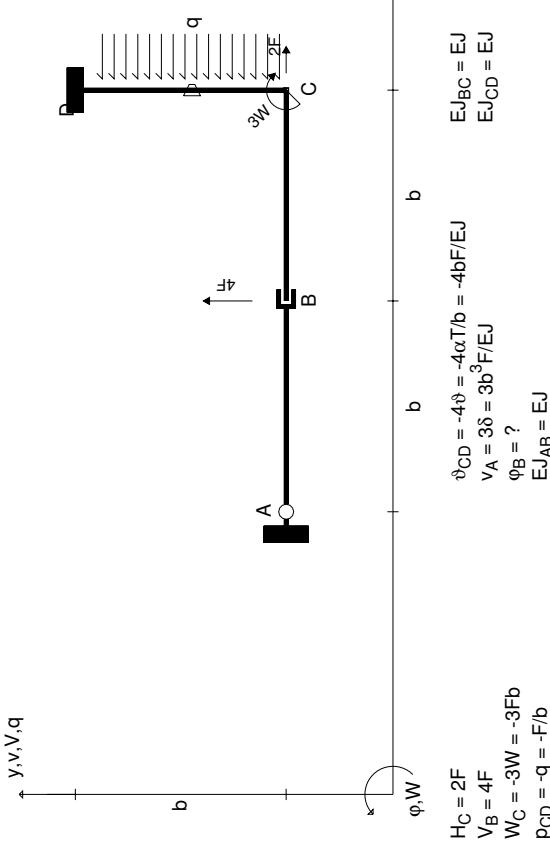
$$BC \ y(x)EJ =$$

$$CD \ y(x)EJ =$$

SPOSTAMENTI ASSOLUTI

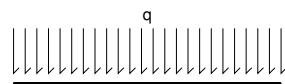
$$\varphi_{AAB} =$$





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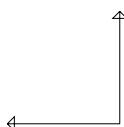
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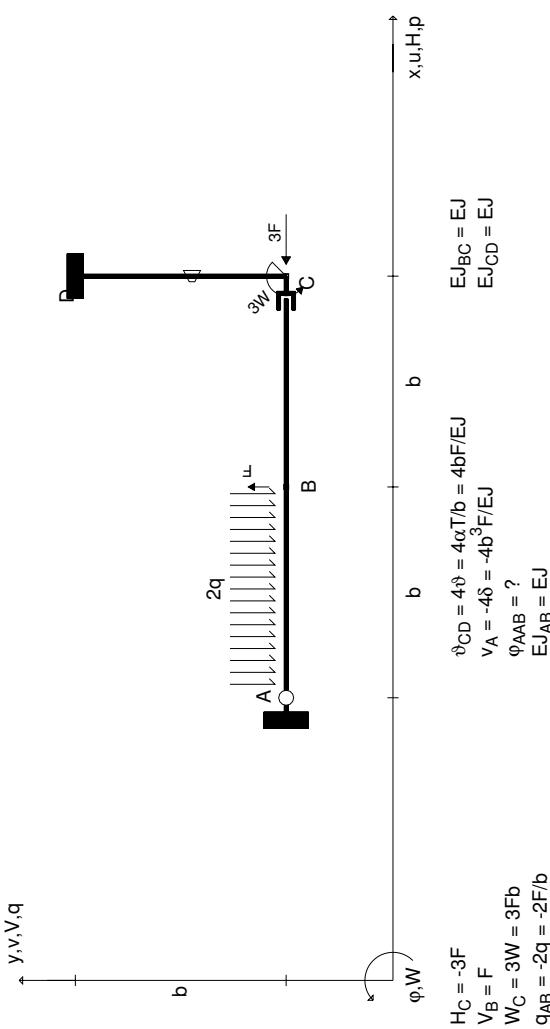
$$BC \ y(x)EJ =$$

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SPOSTAMENTI ASSOLUTI

$$\phi_B =$$





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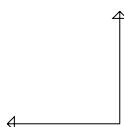
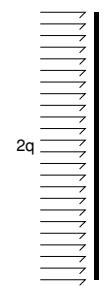
$$AB \ y(x)EJ =$$

$$BC \ y(x)EJ =$$

$$CD \ y(x)EJ =$$

SPOSTAMENTI ASSOLUTI

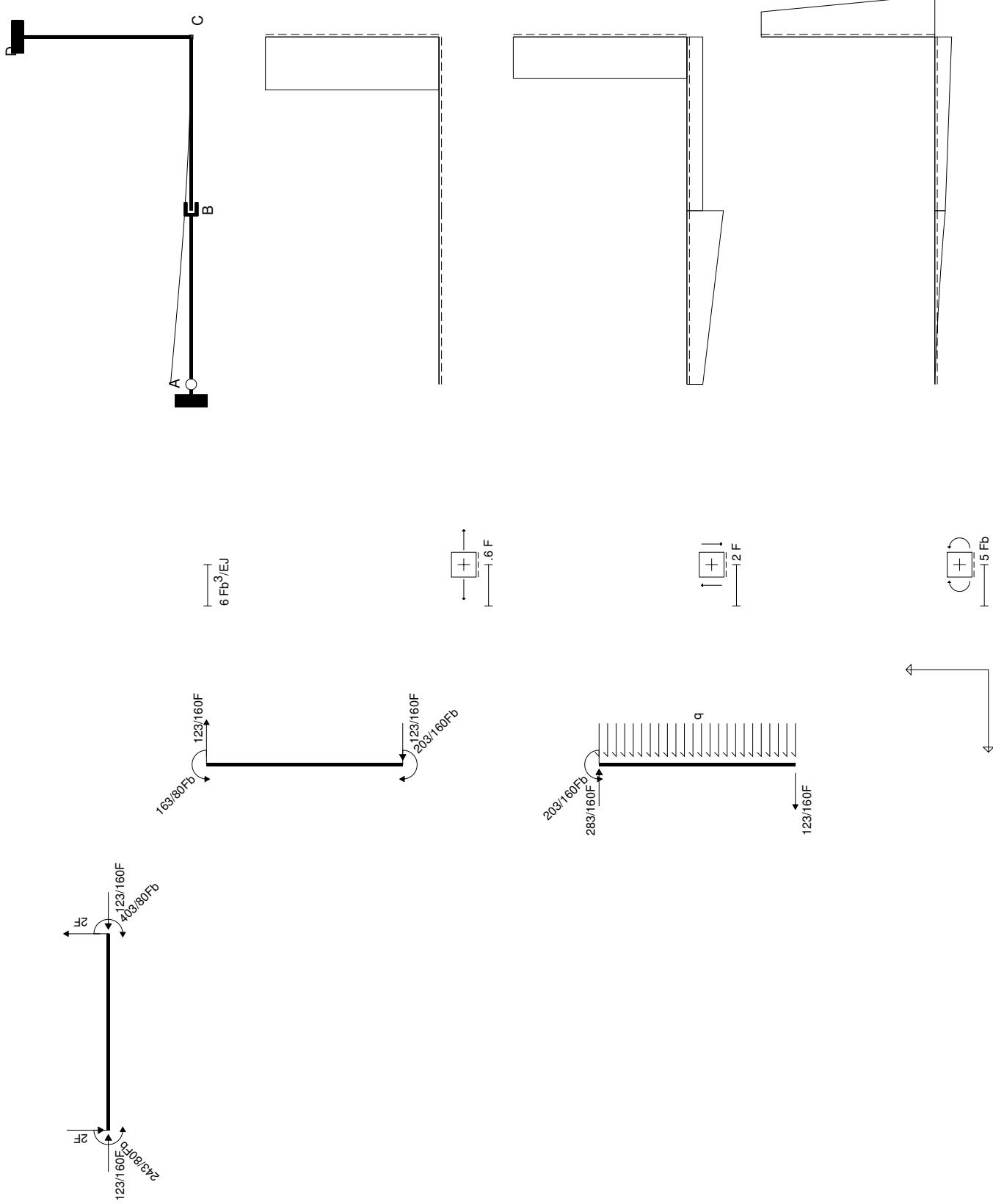
$$\varphi_{AAB} =$$



REAZIONI

DEFORMATA E AZIONI INTERNE

N.001



DEFORMATA (coordinate locali)

$$AB \ y(x)EJ = 3Fb^3 - 269/120xFb^2 + 41/320x^3F + 1/24x^4q$$

$$BA \ y(x)EJ = 297/320Fb^3 + 541/320xFb^2 + 203/320x^2Fb - 283/960x^3F + 1/24x^4q$$

$$BC \ y(x)EJ = 297/320Fb^3 - 541/320xFb^2 + 203/320x^2Fb + 41/320x^3F$$

$$CB \ y(x)EJ = 3/80xFb^2 + 163/160x^2Fb - 41/320x^3F$$

$$CD \ y(x)EJ = -71/480Fb^3 - 3/80xFb^2 + 83/160x^2Fb - 1/3x^3F$$

$$DC \ y(x)EJ = -77/160x^2Fb + 1/3x^3F$$

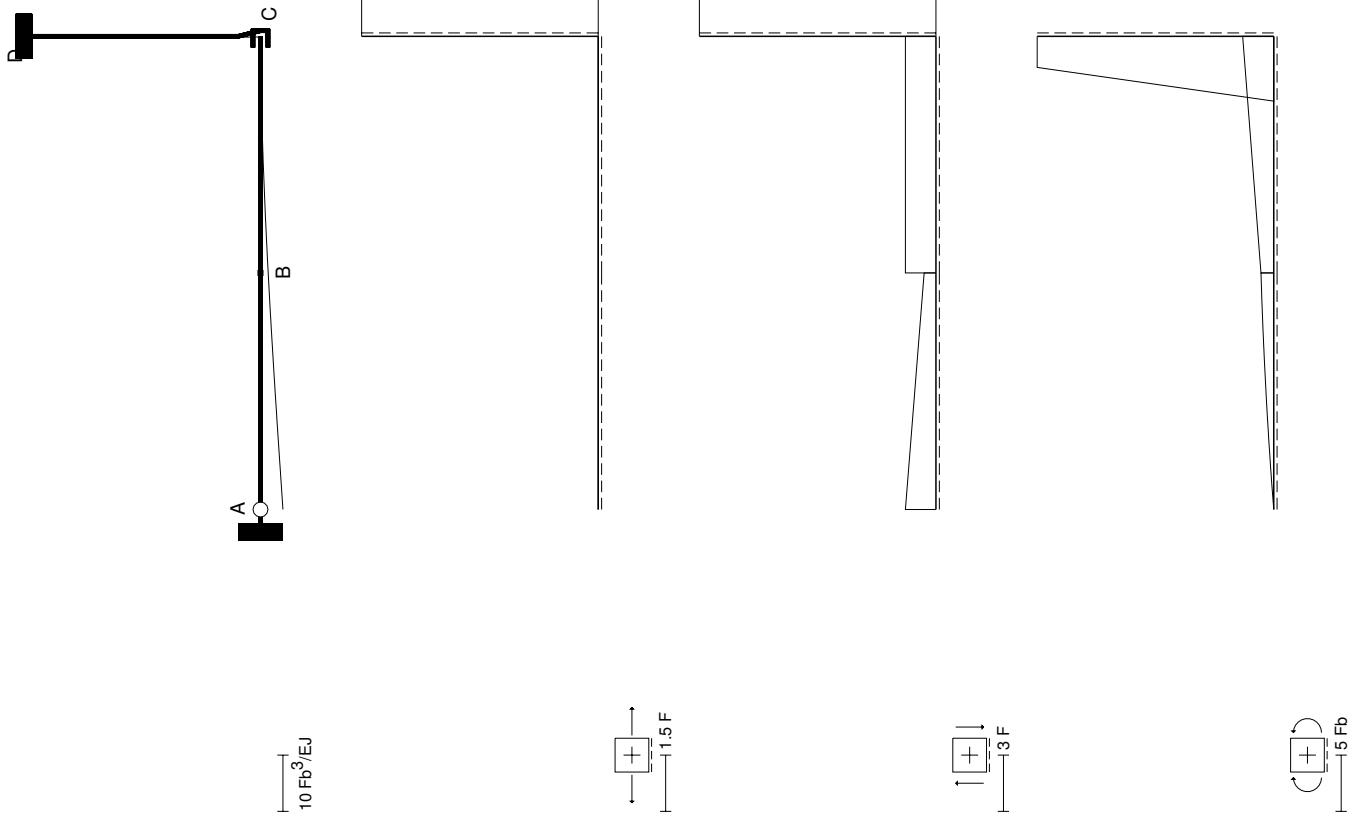
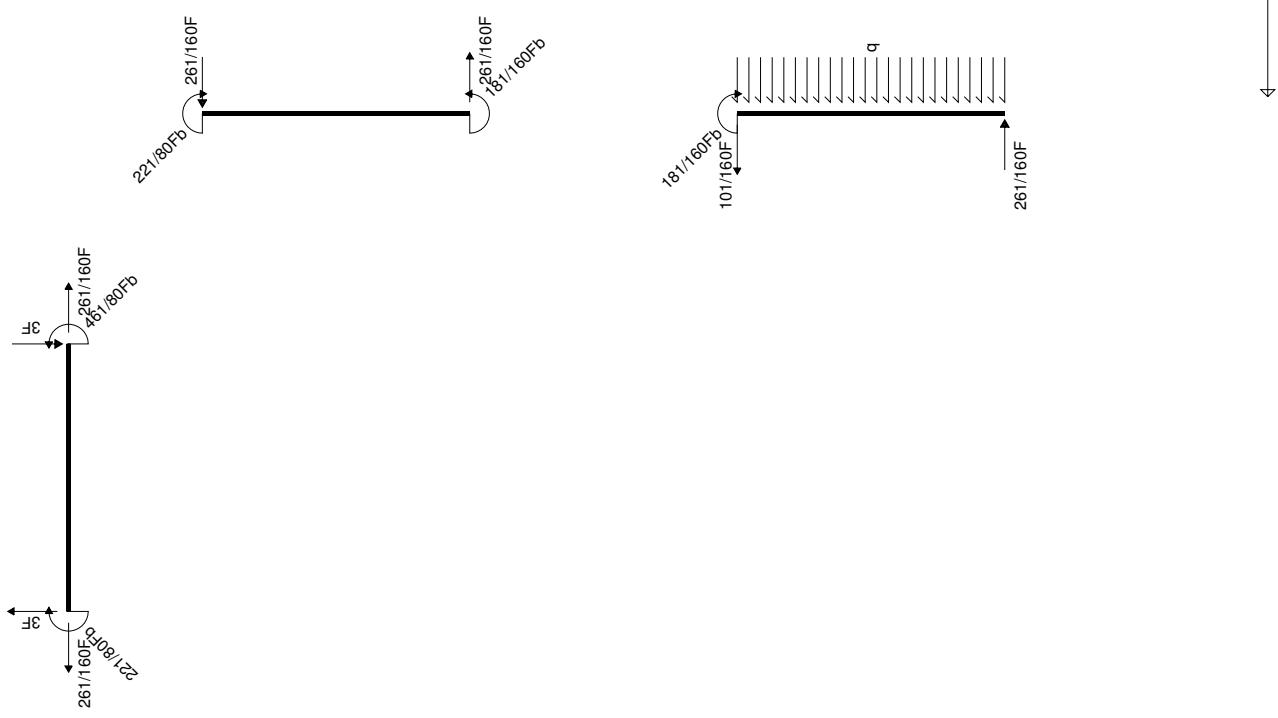
SPOSTAMENTI ASSOLUTI

$$\varphi_{AAB} = -269/120(Fb^2/EJ)$$

REAZIONI

DEFORMATA E AZIONI INTERNE

N.002



DEFORMATA (coordinate locali)

$$AB \ y(x)EJ = -4Fb^3 + 343/120xFb^2 - 87/320x^3F + 1/24x^4q$$

$$BA \ y(x)EJ = -439/320Fb^3 - 707/320xFb^2 - 181/320x^2Fb + 101/960x^3F + 1/24x^4q$$

$$BC \ y(x)EJ = -439/320Fb^3 + 707/320xFb^2 - 181/320x^2Fb - 87/320x^3F$$

$$CB \ y(x)EJ = -21/80xFb^2 - 221/160x^2Fb + 87/320x^3F$$

$$CD \ y(x)EJ = 19/160Fb^3 + 21/80xFb^2 - 141/160x^2Fb + 1/2x^3F$$

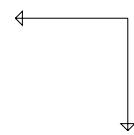
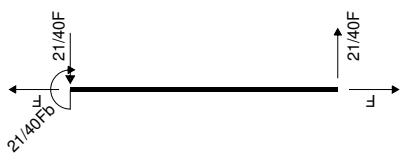
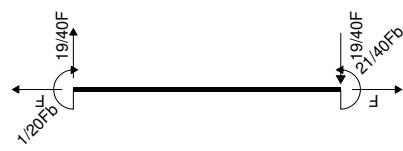
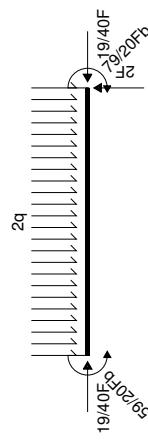
$$DC \ y(x)EJ = 99/160x^2Fb - 1/2x^3F$$

SPOSTAMENTI ASSOLUTI

$$\varphi_{AB} = 343/120(Fb^2/EJ)$$

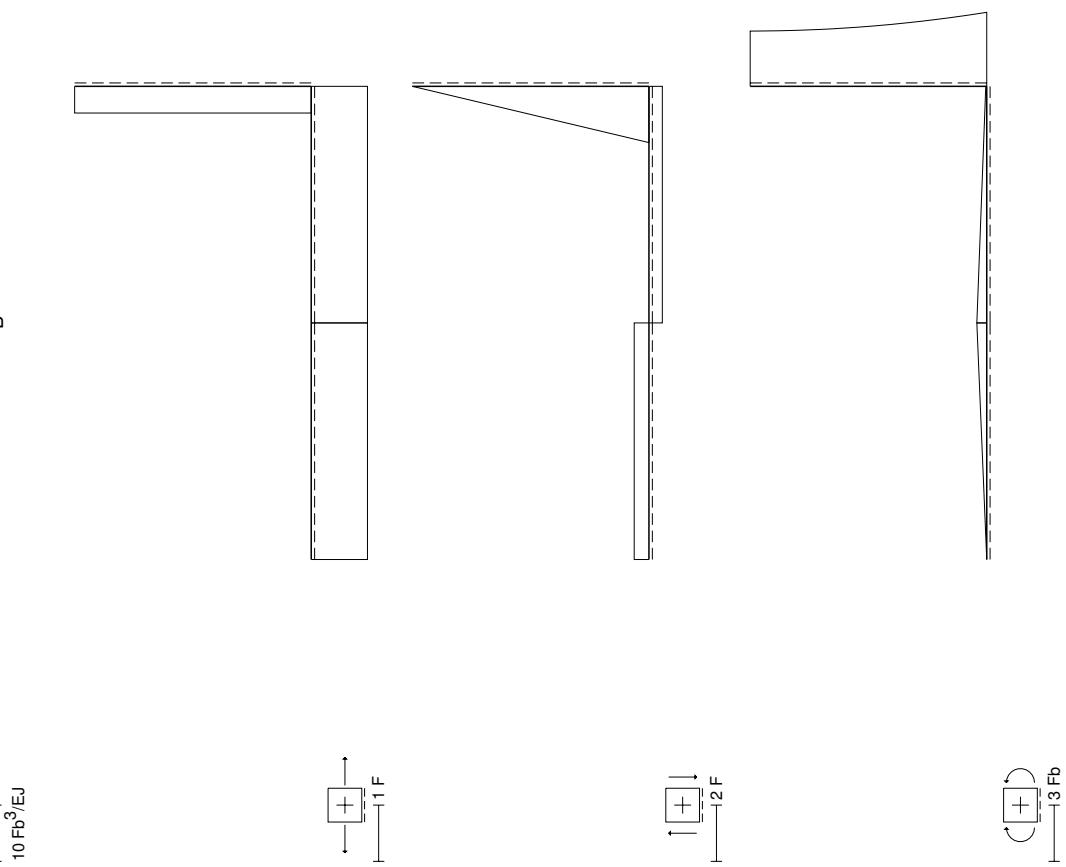
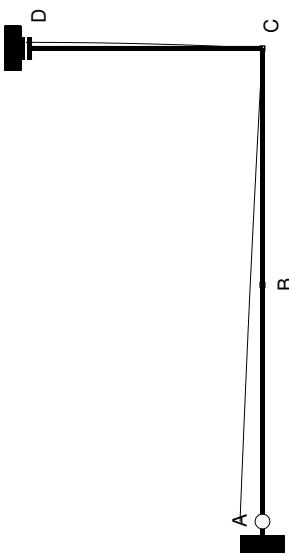
REAZIONI

N.003



DEFORMATA E AZIONI INTERNE

N.003



DEFORMATA (coordinate locali)

$$AB \ y(x)EJ = 4Fb^3 - 26/15xFb^2 - 7/80x^3F$$

$$BA \ y(x)EJ = 523/240Fb^3 + 479/240xFb^2 - 21/80x^2Fb + 7/80x^3F$$

$$BC \ y(x)EJ = 523/240Fb^3 - 479/240xFb^2 - 21/80x^2Fb + 19/240x^3F$$

$$CB \ y(x)EJ = 137/60xFb^2 - 1/40x^2Fb - 19/240x^3F$$

$$CD \ y(x)EJ = -137/60xFb^2 + 59/40x^2Fb - 1/3x^3F + 1/12x^4q$$

$$DC \ y(x)EJ = -127/120Fb^3 + 39/40x^2Fb + 1/12x^4q$$

SPOSTAMENTI ASSOLUTI

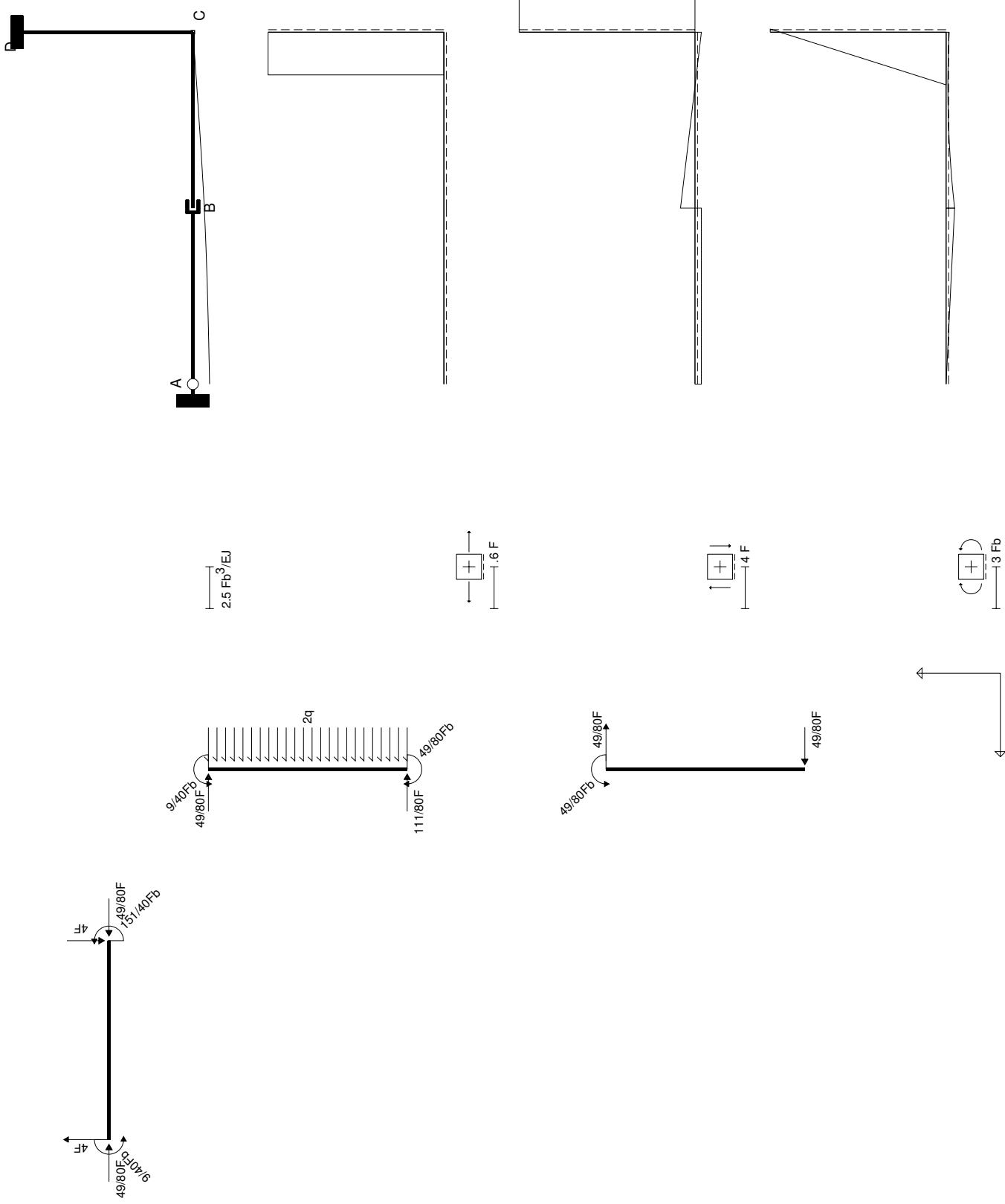
$$\varphi_B = -479/240(Fb^2/EJ)$$

REAZIONI

N.004

DEFORMATA E AZIONI INTERNE

N.004



DEFORMATA (coordinate locali)

$$AB \ y(x)EJ = -Fb^3 + 13/60xFb^2 + 49/480x^3F$$

$$BA \ y(x)EJ = -109/160Fb^3 - 251/480xFb^2 + 49/160x^2Fb - 49/480x^3F$$

$$BC \ y(x)EJ = -109/160Fb^3 + 251/480xFb^2 + 49/160x^2Fb - 37/160x^3F + 1/12x^4q$$

$$CB \ y(x)EJ = -31/40xFb^2 + 9/80x^2Fb - 49/480x^3F + 1/12x^4q$$

$$CD \ y(x)EJ = -13/240Fb^3 + 31/40xFb^2 - 111/80x^2Fb + 2/3x^3F$$

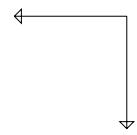
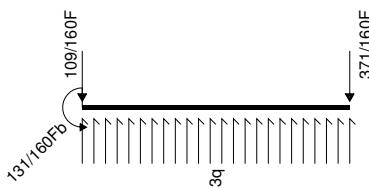
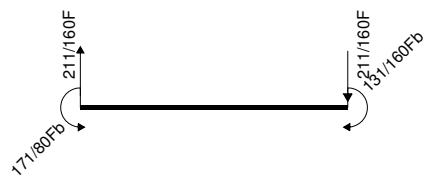
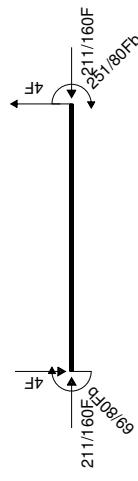
$$DC \ y(x)EJ = 49/80x^2Fb - 2/3x^3F$$

SPOSTAMENTI ASSOLUTI

$$\varphi_B = 251/480(Fb^2/EJ)$$

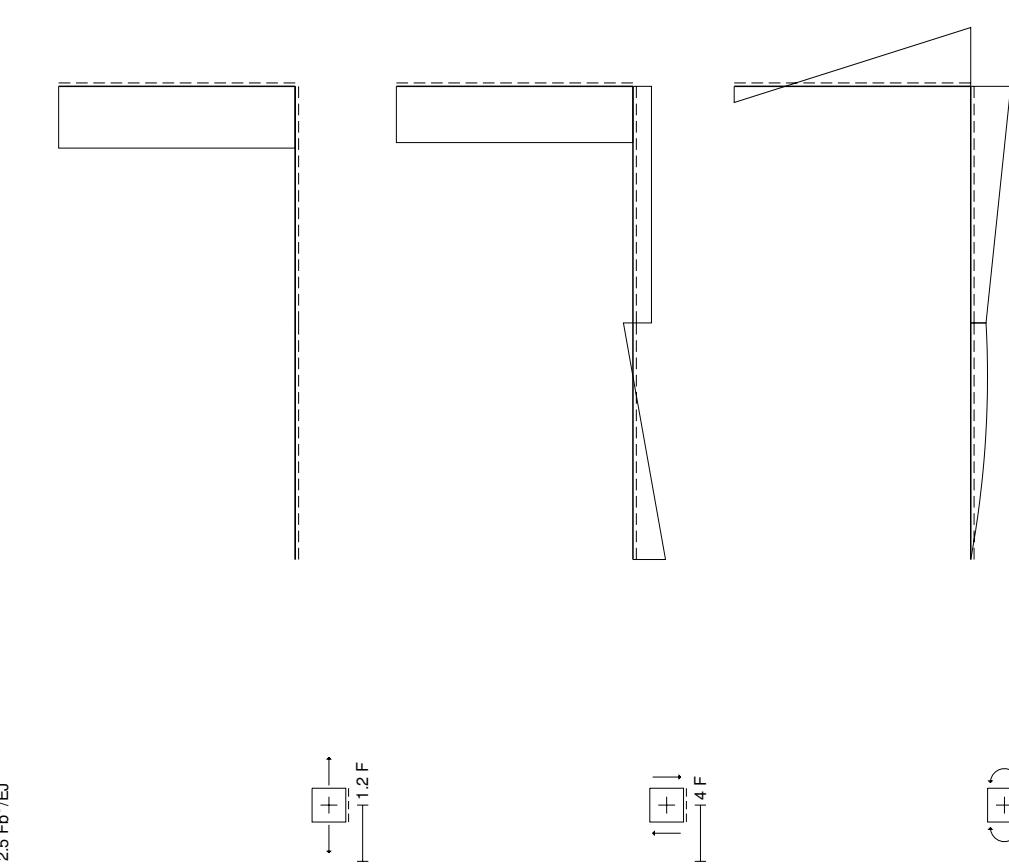
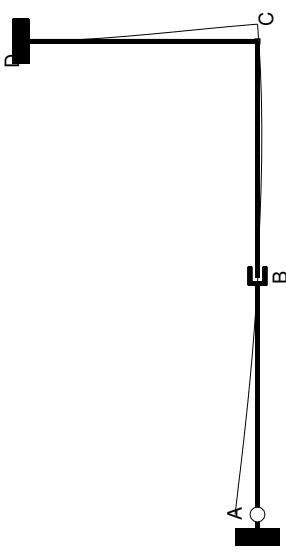
REAZIONI

N.005



DEFORMATA E AZIONI INTERNE

N.005



DEFORMATA (coordinate locali)

$$AB \ y(x)EJ = Fb^3 - 51/40xFb^2 + 371/960x^3F - 1/8x^4q$$

$$BA \ y(x)EJ = -13/960Fb^3 + 197/320xFb^2 + 131/320x^2Fb + 109/960x^3F - 1/8x^4q$$

$$BC \ y(x)EJ = -13/960Fb^3 - 197/320xFb^2 + 131/320x^2Fb + 211/960x^3F$$

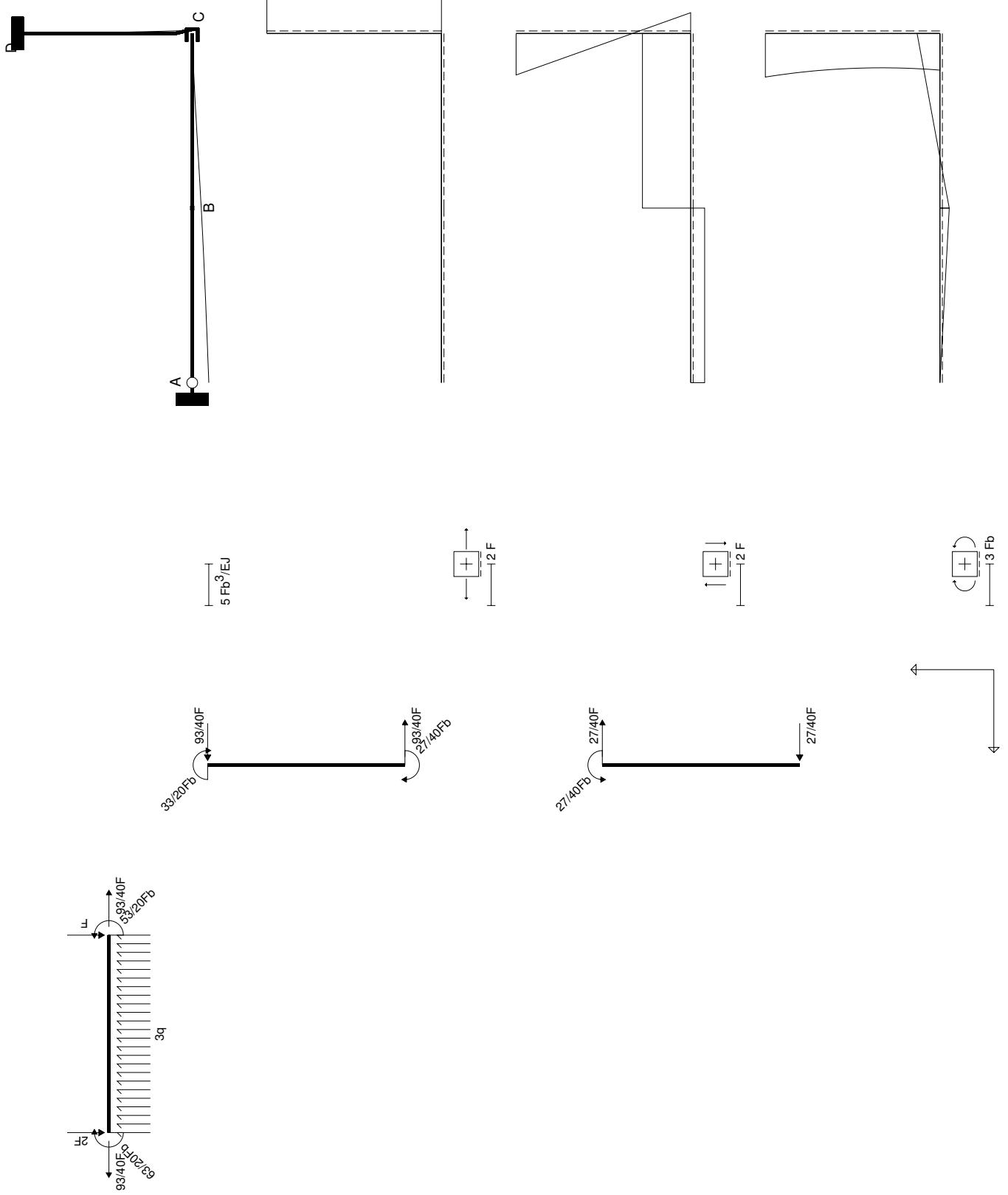
$$CB \ y(x)EJ = -69/80xFb^2 + 171/160x^2Fb - 211/960x^3F$$

$$CD \ y(x)EJ = -367/480Fb^3 + 69/80xFb^2 + 91/160x^2Fb - 2/3x^3F$$

$$DC \ y(x)EJ = -229/160xFb^2 + 2/3x^3F$$

SPOSTAMENTI ASSOLUTI

$$\varphi_{AB} = -51/40(Fb^2/EJ)$$



DEFORMATA (coordinate locali)

$$AB \ y(x)EJ = -2Fb^3 + 4/5xFb^2 + 9/80x^3F$$

$$BA \ y(x)EJ = -87/80Fb^3 - 91/80xFb^2 + 27/80x^2Fb - 9/80x^3F$$

$$BC \ y(x)EJ = -87/80Fb^3 + 91/80xFb^2 + 27/80x^2Fb - 31/80x^3F$$

$$CB \ y(x)EJ = -13/20xFb^2 - 33/40x^2Fb + 31/80x^3F$$

$$CD \ y(x)EJ = -11/30Fb^3 + 13/20xFb^2 - 13/40x^2Fb + 1/6x^3F - 1/8x^4q$$

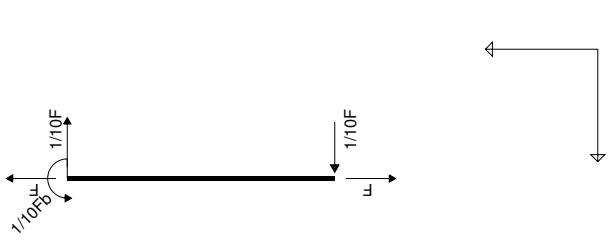
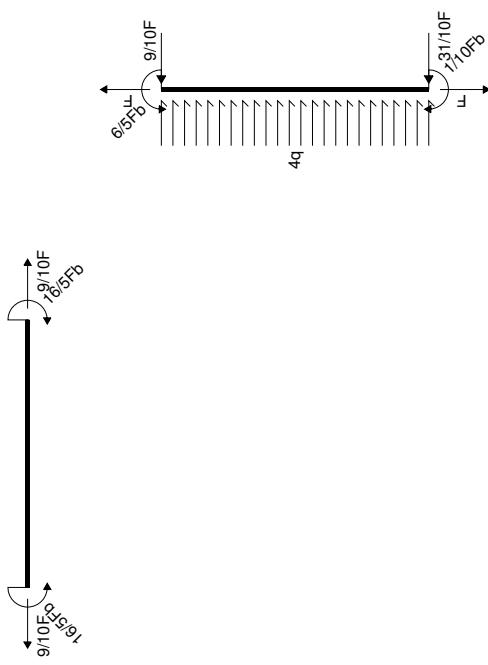
$$DC \ y(x)EJ = -23/40xFb^2 + 1/3x^3F - 1/8x^4q$$

SPOSTAMENTI ASSOLUTI

$$\varphi_B = 91/80(Fb^2/EJ)$$

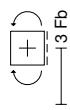
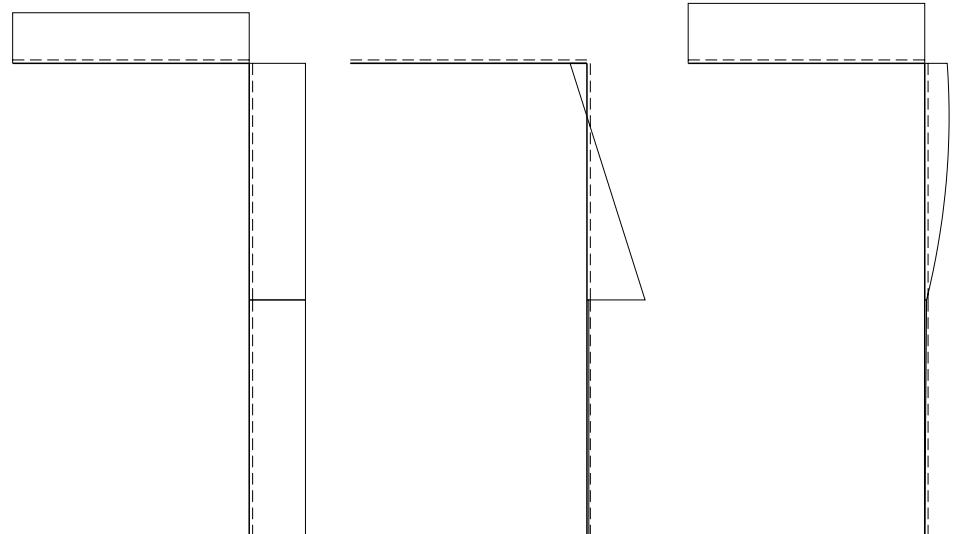
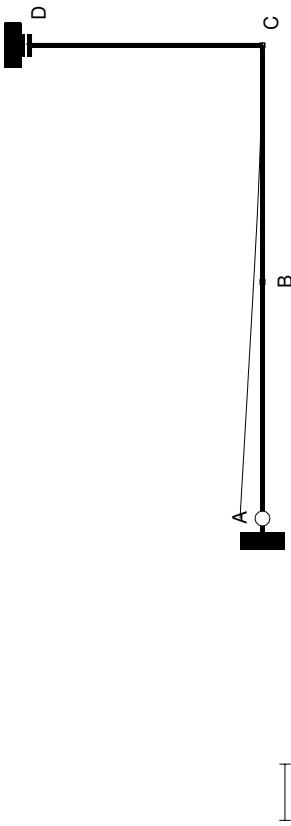
REAZIONI

N.007



DEFORMATA E AZIONI INTERNE

N.007



DEFORMATA (coordinate locali)

$$AB \ y(x)EJ = 2Fb^3 - 37/30xFb^2 + 1/60x^3F$$

$$BA \ y(x)EJ = 47/60Fb^3 + 71/60xFb^2 + 1/20x^2Fb - 1/60x^3F$$

$$BC \ y(x)EJ = 47/60Fb^3 - 71/60xFb^2 + 1/20x^2Fb + 31/60x^3F - 1/6x^4q$$

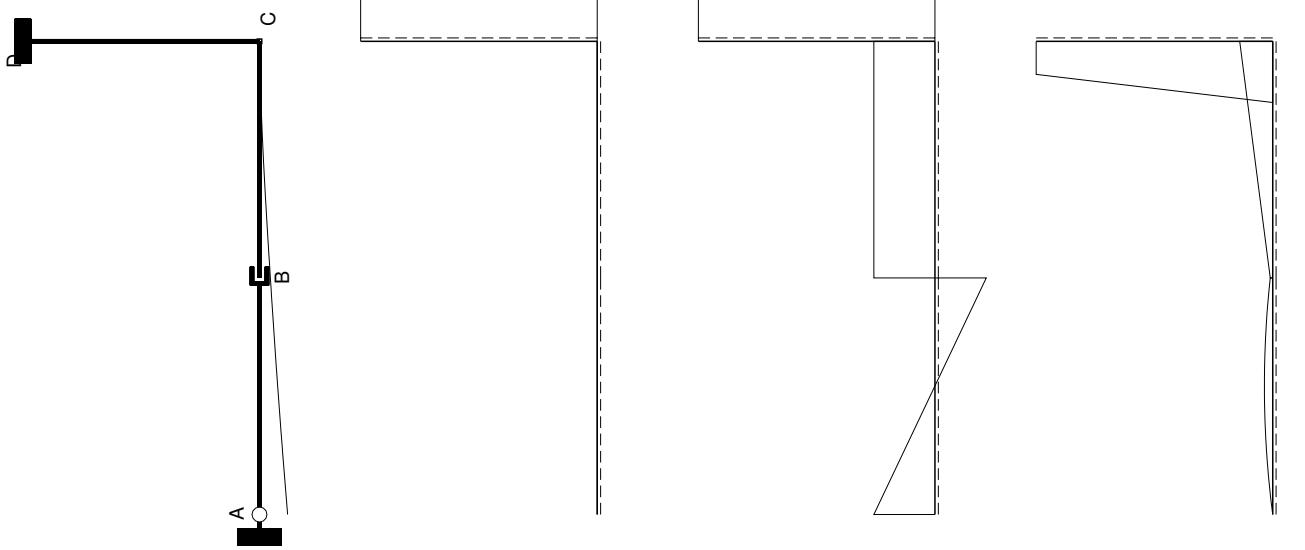
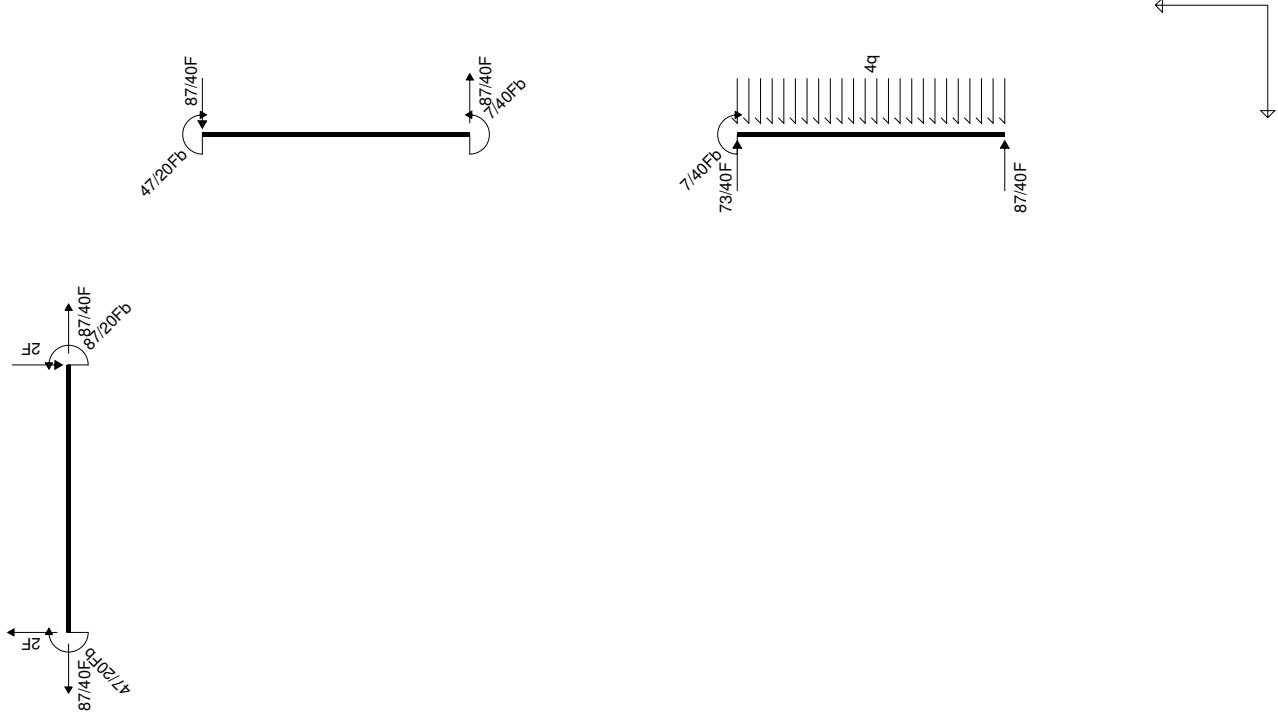
$$CB \ y(x)EJ = 1/5xFb^2 + 3/5x^2Fb + 3/20x^3F - 1/6x^4q$$

$$CD \ y(x)EJ = -1/5xFb^2 + 1/10x^2Fb$$

$$DC \ y(x)EJ = -1/10Fb^3 + 1/10x^2Fb$$

SPOSTAMENTI ASSOLUTI

$$\varphi_{AB} = -37/30(Fb^2/EJ)$$



DEFORMATA (coordinate locali)

$$AB \ y(x)EJ = -3Fb^3 + 61/30xFb^2 - 29/80x^3F + 1/6x^4q$$

$$BA \ y(x)EJ = -93/80Fb^3 - 129/80xFb^2 - 7/80x^2Fb - 73/240x^3F + 1/6x^4q$$

$$BC \ y(x)EJ = -93/80Fb^3 + 129/80xFb^2 - 7/80x^2Fb - 29/80x^3F$$

$$CB \ y(x)EJ = -7/20xFb^2 - 47/40x^2Fb + 29/80x^3F$$

$$CD \ y(x)EJ = -1/120Fb^3 + 7/20xFb^2 - 27/40x^2Fb + 1/3x^3F$$

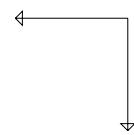
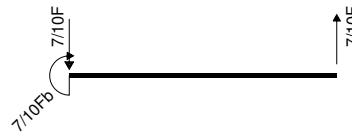
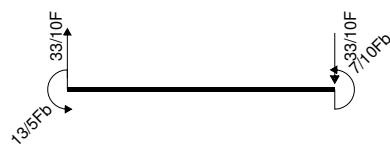
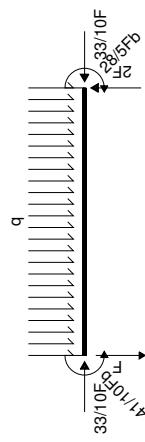
$$DC \ y(x)EJ = 13/40x^2Fb - 1/3x^3F$$

SPOSTAMENTI ASSOLUTI

$$\varphi_{AB} = 61/30(Fb^2/EJ)$$

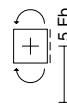
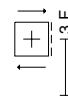
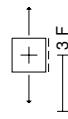
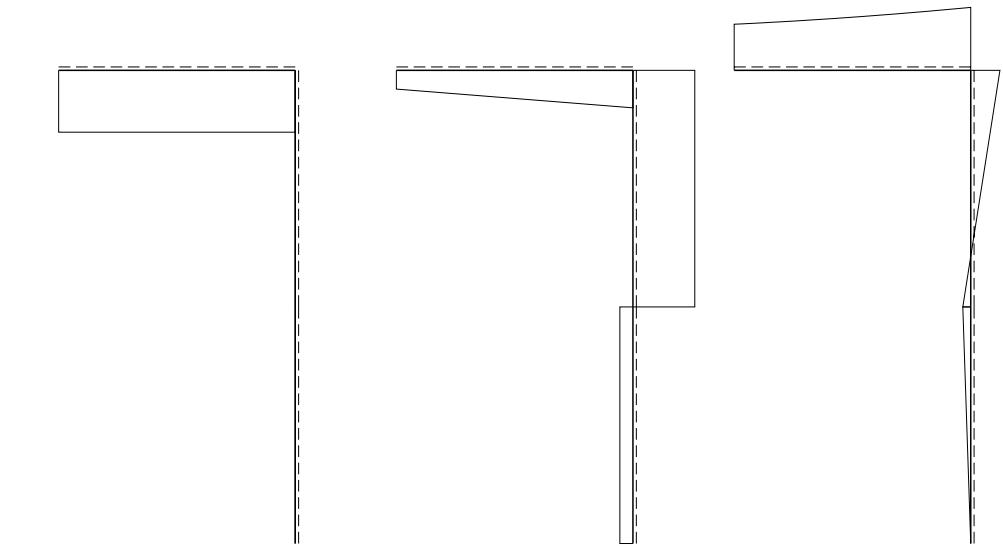
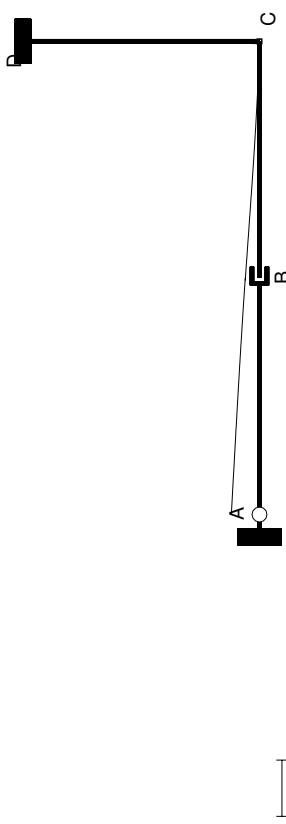
REAZIONI

N.009



DEFORMATA E AZIONI INTERNE

N.009



DEFORMATA (coordinate locali)

$$AB \ y(x)EJ = 3Fb^3 - 41/30xFb^2 - 7/60x^3F$$

$$BA \ y(x)EJ = 91/60Fb^3 + 103/60xFb^2 - 7/20x^2Fb + 7/60x^3F$$

$$BC \ y(x)EJ = 91/60Fb^3 - 103/60xFb^2 - 7/20x^2Fb + 11/20x^3F$$

$$CB \ y(x)EJ = 23/30xFb^2 + 13/10x^2Fb - 11/20x^3F$$

$$CD \ y(x)EJ = 31/120Fb^3 - 23/30xFb^2 + 4/5x^2Fb - 1/3x^3F + 1/24x^4q$$

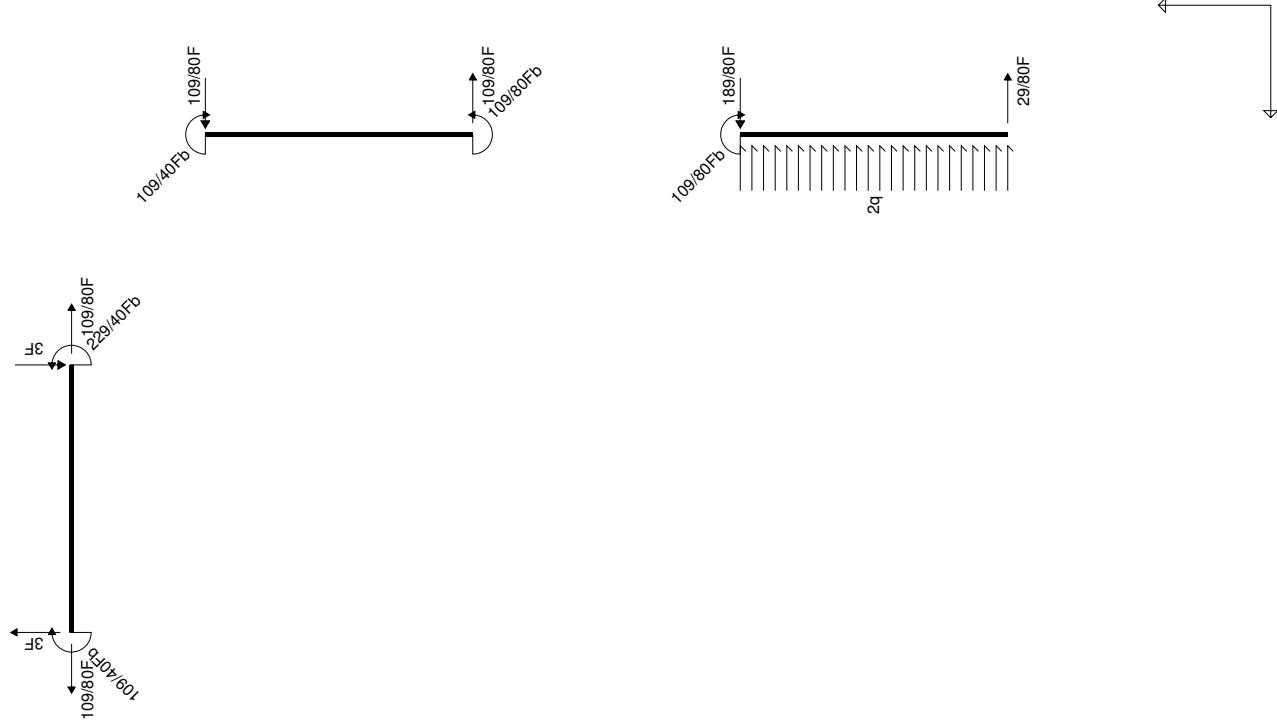
$$DC \ y(x)EJ = 1/20x^2Fb + 1/6x^3F + 1/24x^4q$$

SPOSTAMENTI ASSOLUTI

$$\varphi_B = -103/60(Fb^2/EJ)$$

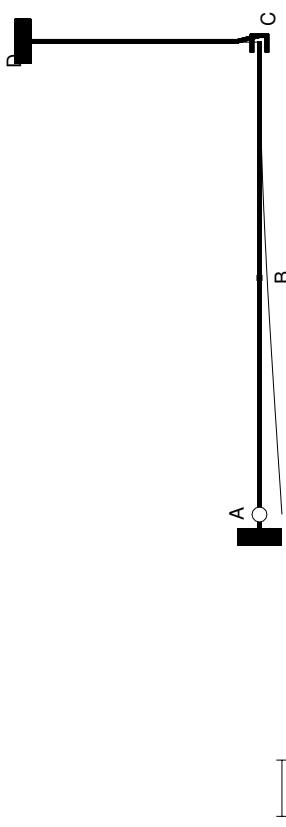
REAZIONI

N.010



DEFORMATA E AZIONI INTERNE

N.010



DEFORMATA (coordinate locali)

$$AB \ y(x)EJ = -4Fb^3 + 167/60xFb^2 - 29/480x^3F - 1/12x^4q$$

$$BA \ y(x)EJ = -653/480Fb^3 - 363/160xFb^2 - 109/160x^2Fb + 63/160x^3F - 1/12x^4q$$

$$BC \ y(x)EJ = -653/480Fb^3 + 363/160xFb^2 - 109/160x^2Fb - 109/480x^3F$$

$$CB \ y(x)EJ = -9/40xFb^2 - 109/80x^2Fb + 109/480x^3F$$

$$CD \ y(x)EJ = 11/80Fb^3 + 9/40xFb^2 - 69/80x^2Fb + 1/2x^3F$$

$$DC \ y(x)EJ = 51/80x^2Fb - 1/2x^3F$$

SPOSTAMENTI ASSOLUTI

$$\varphi_{AB} = 167/60(Fb^2/EJ)$$