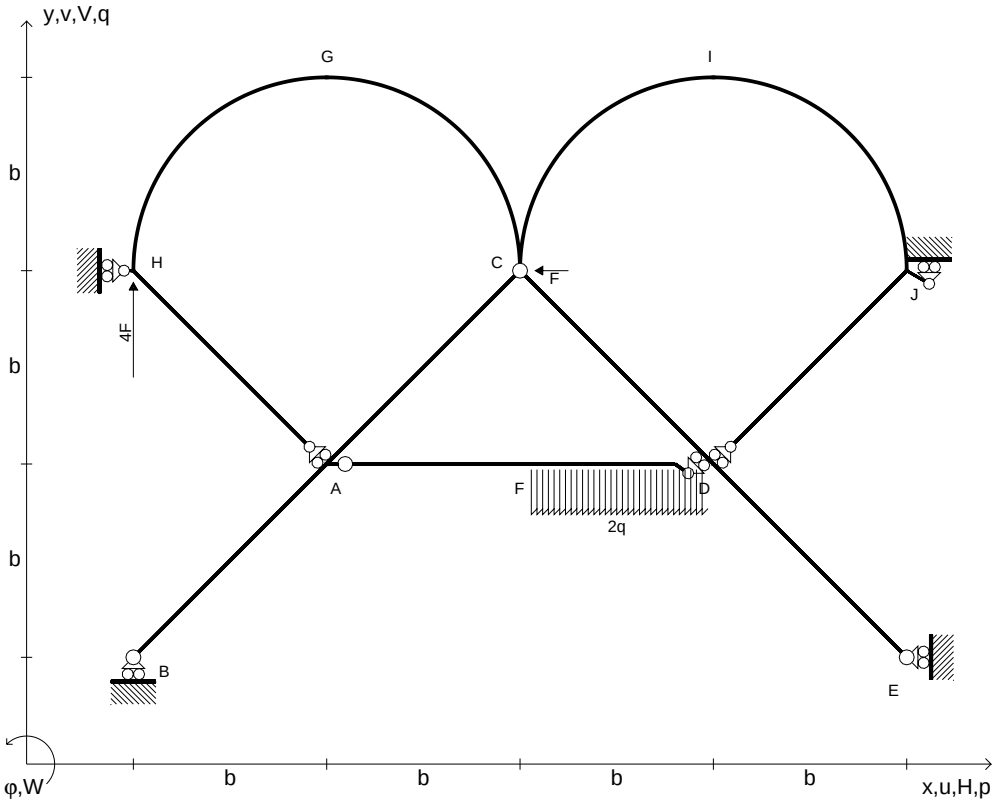


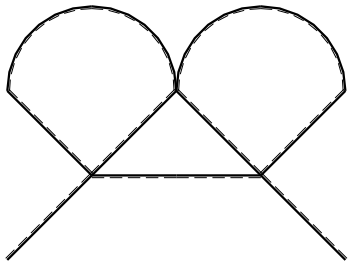
$H_C = -F$
$V_H = 4F$
$q_{FD} = -2q = -2F/b$

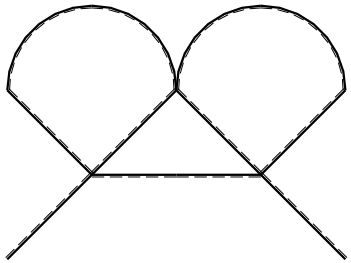
1 1 Piano AH

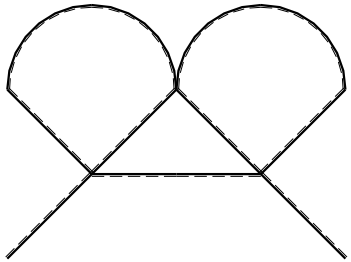
1 1 Piano DF

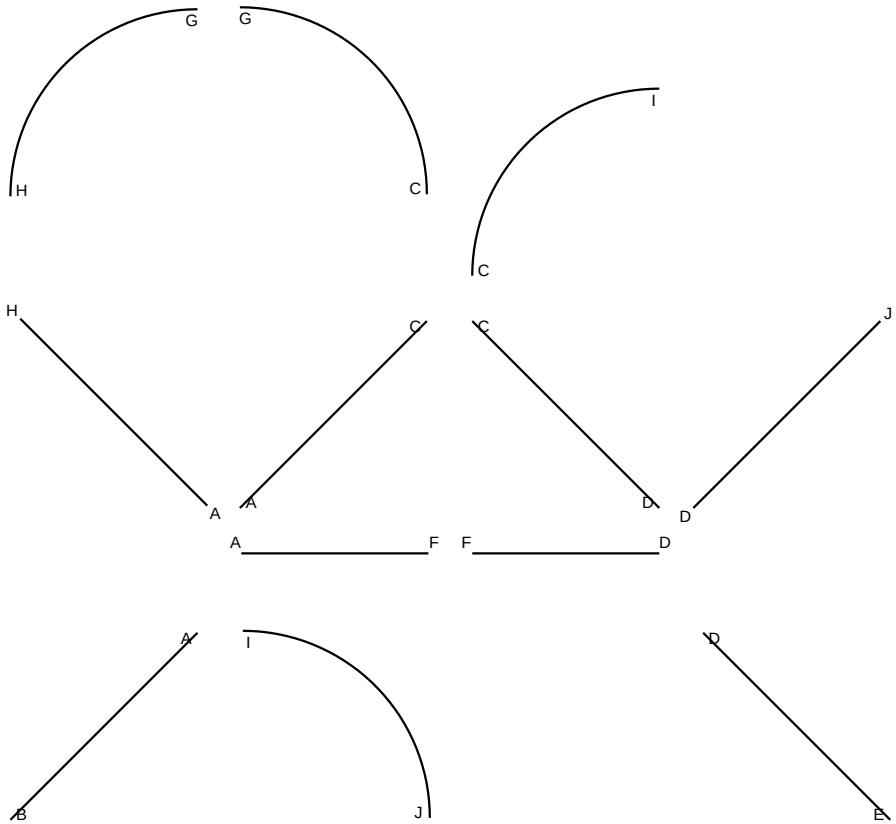
1 1 Piano DJ

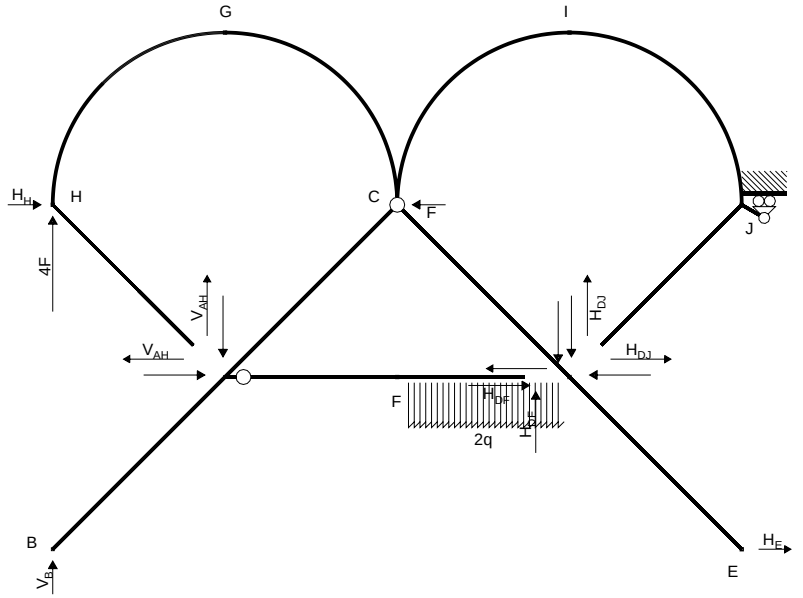
.
Svolgere l'analisi cinematica geometrica ed analitica.
Determinare matrice di congruenza e di equilibrio.
Determinare le reazioni vincolari a terra col PLV (Le=0).
Determinare le azioni interne in A (asta AC) col PLV (Le=0).
.
Carichi e deformazioni date hanno verso efficace in disegno.
Calcolare reazioni vincolari della struttura e delle aste.
Tracciare i diagrammi delle azioni interne nelle aste.
Piano di scorrimento del vincolo con inclinazione assegnata.











EQUAZIONI DI EQUILIBRIO

Traslazione orizzontale globale

$H_E + H_H = F$

Rotazione globale intorno a J

$-4V_B b + 2H_E b = 16Fb - 3qb^2$

Rotazione intorno a C: aste CA AB AF FD

$-2V_B b + 2H_{DF} b + 2V_{AH} b = qb^2$

Rotazione intorno a C: aste CD DE

$2H_E b - 2H_{DF} b - 2H_{DJ} b = 0$

Rotazione intorno a C: aste CG GH HA

$-2V_{AH} b = 8Fb$

Rotazione intorno a A: aste AF FD

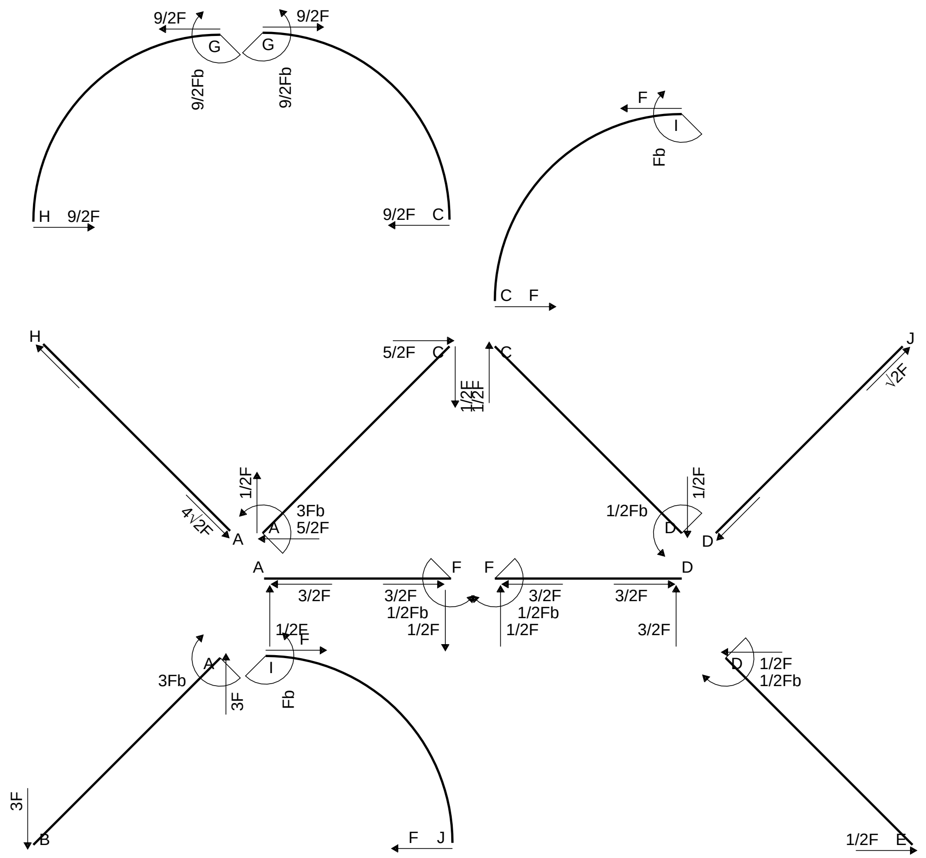
$2H_{DF} b = 3qb^2$

Matrice di equilibrio

$$\begin{array}{c} \\ u_J \\ \varphi_J \\ \varphi_{CA} \\ \varphi_{CD} \\ \varphi_{CG} \\ \varphi_{AF} \end{array} \begin{bmatrix} V_B b & H_E b & H_H b & H_{DF} b & V_{AH} b & H_{DJ} b \\ 0 & 1 & 1 & 0 & 0 & 0 \\ -4 & 2 & 0 & 0 & 0 & 0 \\ -2 & 0 & 0 & 2 & 2 & 0 \\ 0 & 2 & 0 & -2 & 0 & -2 \\ 0 & 0 & 0 & 0 & -2 & 0 \\ 0 & 0 & 0 & 2 & 0 & 0 \end{bmatrix} = \begin{bmatrix} Fb & qb^2 \\ 1 & 0 \\ 16 & -3 \\ 0 & 1 \\ 0 & 0 \\ 8 & 0 \\ 0 & 3 \end{bmatrix}$$

Soluzione del sistema

$$\begin{bmatrix} H_E b \\ V_B b \\ H_H b \\ H_{DF} b \\ V_{AH} b \\ H_{DJ} b \end{bmatrix} = \begin{bmatrix} Fb & qb^2 \\ 0 & 1/2 \\ -4 & 1 \\ 1 & -1/2 \\ 0 & 3/2 \\ -4 & 0 \\ 0 & -1 \end{bmatrix}$$


9/2F
9/2F
G
G
9/2Fb
9/2Fb
H 9/2F
9/2F C
F
I
Fb
C F
H
5/2F C
C
1/2F
1/2F
J
√2F
1/2F
4√2F
A
3Fb
5/2F
A
1/2Fb
D
1/2F
D
A
F
F
D
3/2F
3/2F
1/2Fb
1/2F
3/2F
1/2Fb
1/2F
3/2F
3/2F
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F J
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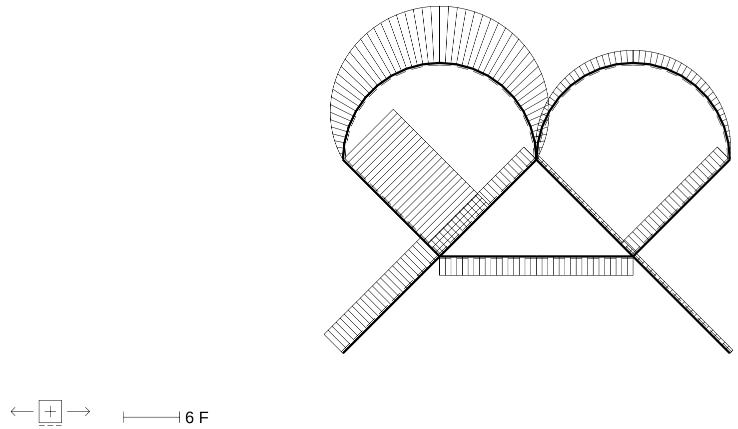
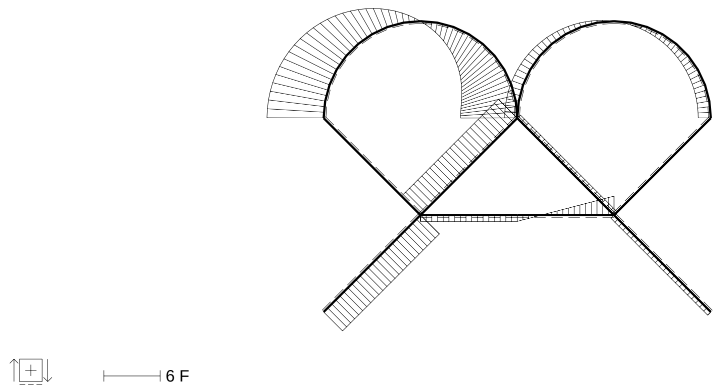
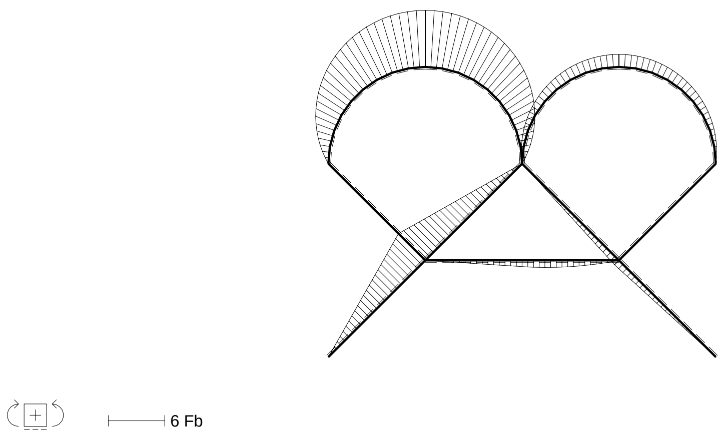

6 F


6 F


6 Fb

Es.N.001

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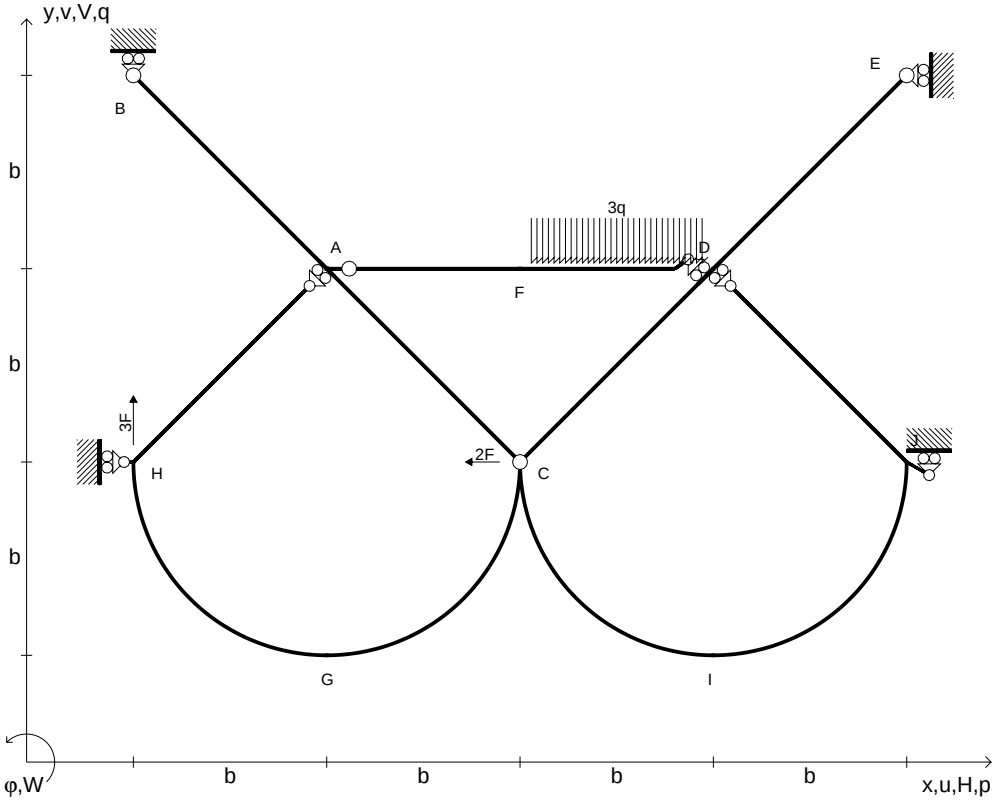


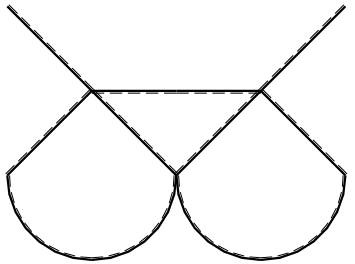
$H_C = -2F$
$V_H = 3F$
$q_{FD} = -3q = -3F/b$

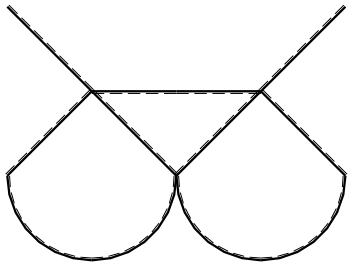
1 1 Piano AH

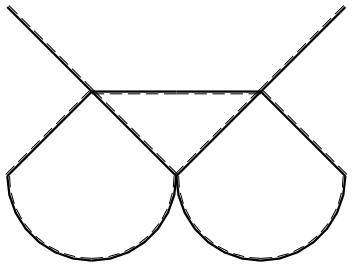
1 1 Piano DF

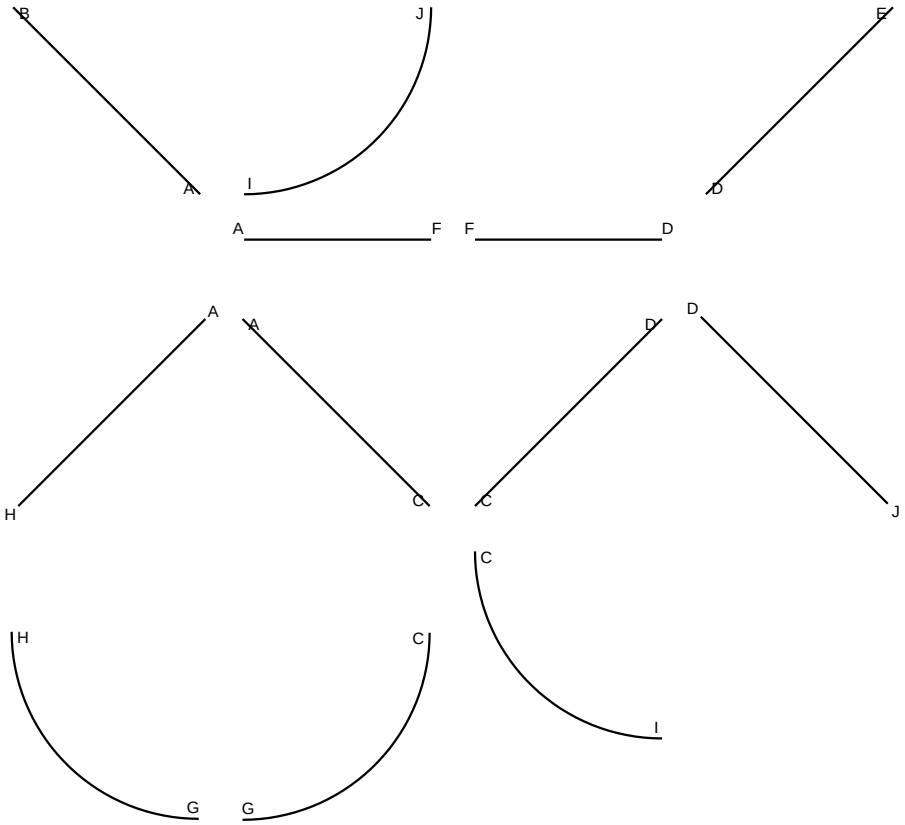
1 1 Piano DJ

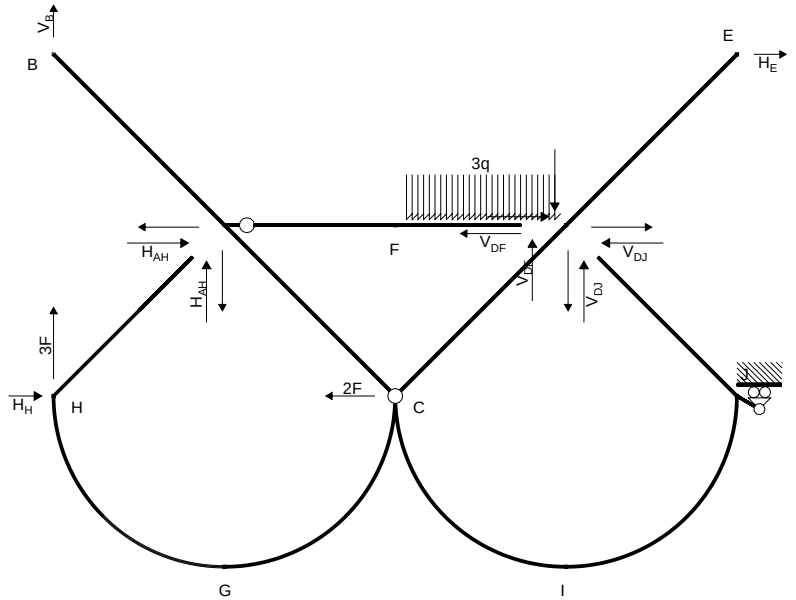
.
Svolgere l'analisi cinematica geometrica ed analitica.
Determinare matrice di congruenza e di equilibrio.
Determinare le reazioni vincolari a terra col PLV (Le=0).
Determinare le azioni interne in A (asta AC) col PLV (Le=0).
.
Carichi e deformazioni date hanno verso efficace in disegno.
Calcolare reazioni vincolari della struttura e delle aste.
Tracciare i diagrammi delle azioni interne nelle aste.
Piano di scorrimento del vincolo con inclinazione assegnata.











EQUAZIONI DI EQUILIBRIO

Traslazione orizzontale globale

$H_E + H_H = 2F$

Rotazione globale intorno a J

$-4V_B b - 2H_E b = 12Fb - 9/2qb^2$

Rotazione intorno a C: aste CA AB AF FD

$-2V_B b + 2V_{DF} b + 2H_{AH} b = 3/2qb^2$

Rotazione intorno a C: aste CD DE

$-2H_E b - 2V_{DF} b - 2V_{DJ} b = 0$

Rotazione intorno a C: aste CG GH HA

$-2H_{AH} b = 6Fb$

Rotazione intorno a A: aste AF FD

$2V_{DF} b = 9/2qb^2$

Matrice di equilibrio

$$\begin{array}{c} \\ u_J \\ \varphi_J \\ \varphi_{CA} \\ \varphi_{CD} \\ \varphi_{CG} \\ \varphi_{AF} \end{array} \begin{bmatrix} V_B b & H_E b & H_H b & V_{DF} b & H_{AH} b & V_{DJ} b \\ 0 & 1 & 1 & 0 & 0 & 0 \\ -4 & -2 & 0 & 0 & 0 & 0 \\ -2 & 0 & 0 & 2 & 2 & 0 \\ 0 & -2 & 0 & -2 & 0 & -2 \\ 0 & 0 & 0 & 0 & -2 & 0 \\ 0 & 0 & 0 & 2 & 0 & 0 \end{bmatrix} = \begin{bmatrix} Fb & qb^2 \\ 2 & 0 \\ 12 & -9/2 \\ 0 & 3/2 \\ 0 & 0 \\ 6 & 0 \\ 0 & 9/2 \end{bmatrix}$$

Soluzione del sistema

$$\begin{bmatrix} H_E b \\ V_B b \\ H_H b \\ V_{DF} b \\ H_{AH} b \\ V_{DJ} b \end{bmatrix} = \begin{bmatrix} Fb & qb^2 \\ 0 & -3/4 \\ -3 & 3/2 \\ 2 & 3/4 \\ 0 & 9/4 \\ -3 & 0 \\ 0 & -3/2 \end{bmatrix}$$

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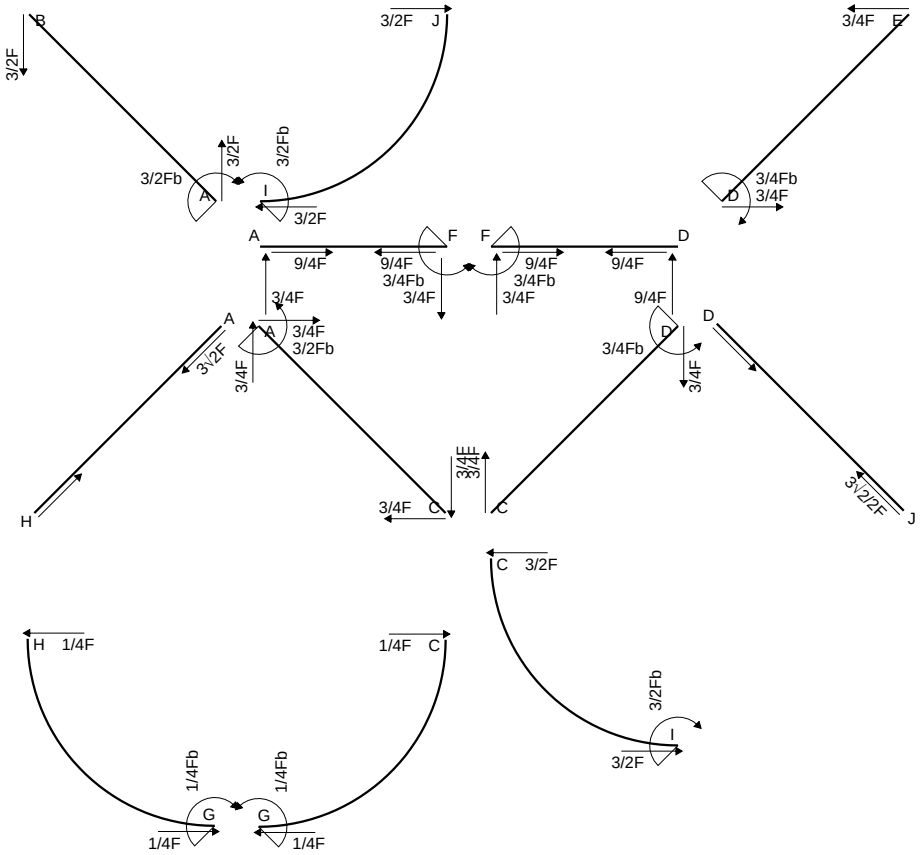
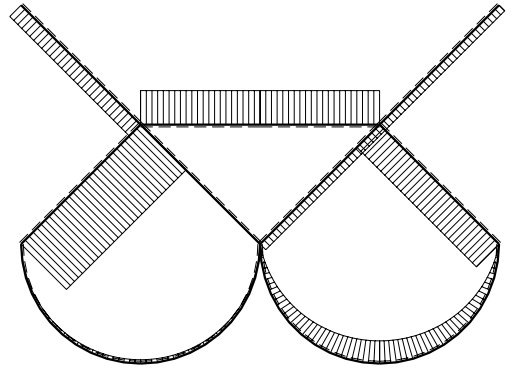
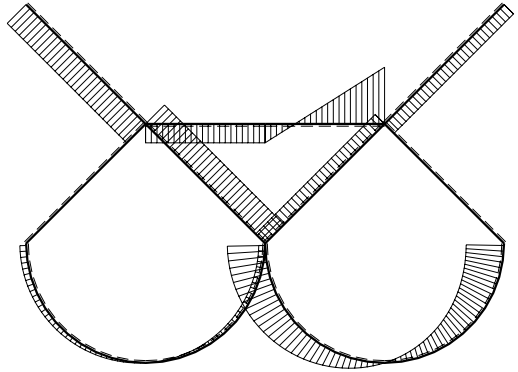
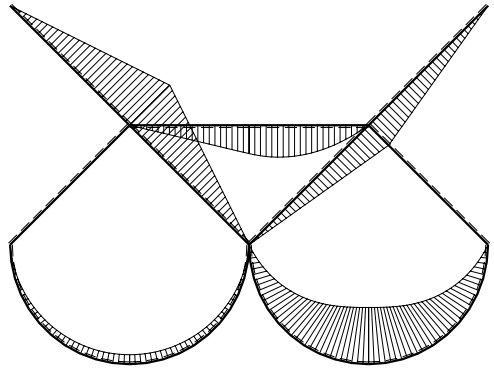




5 F



3 F



2 Fb

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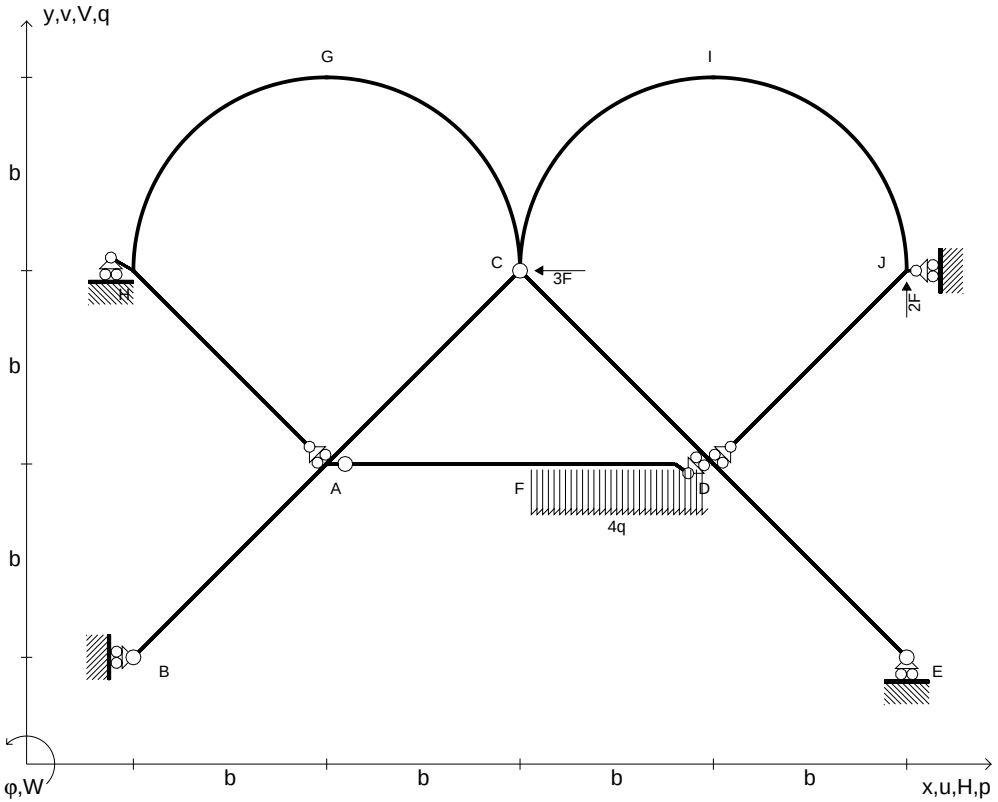

$H_C = -3F$
$V_J = 2F$
$q_{FD} = -4q = -4F/b$

Piano AH

Piano DJ

Piano DF

.
Svolgere l'analisi cinematica geometrica ed analitica.
Determinare matrice di congruenza e di equilibrio.
Determinare le reazioni vincolari a terra col PLV (Le=0).
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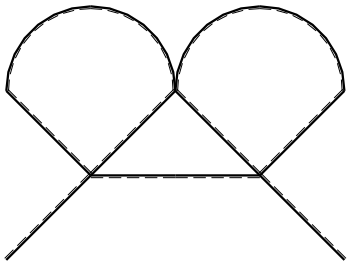
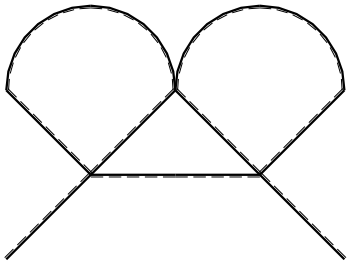
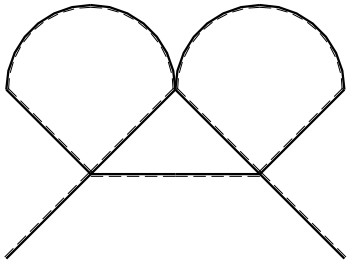
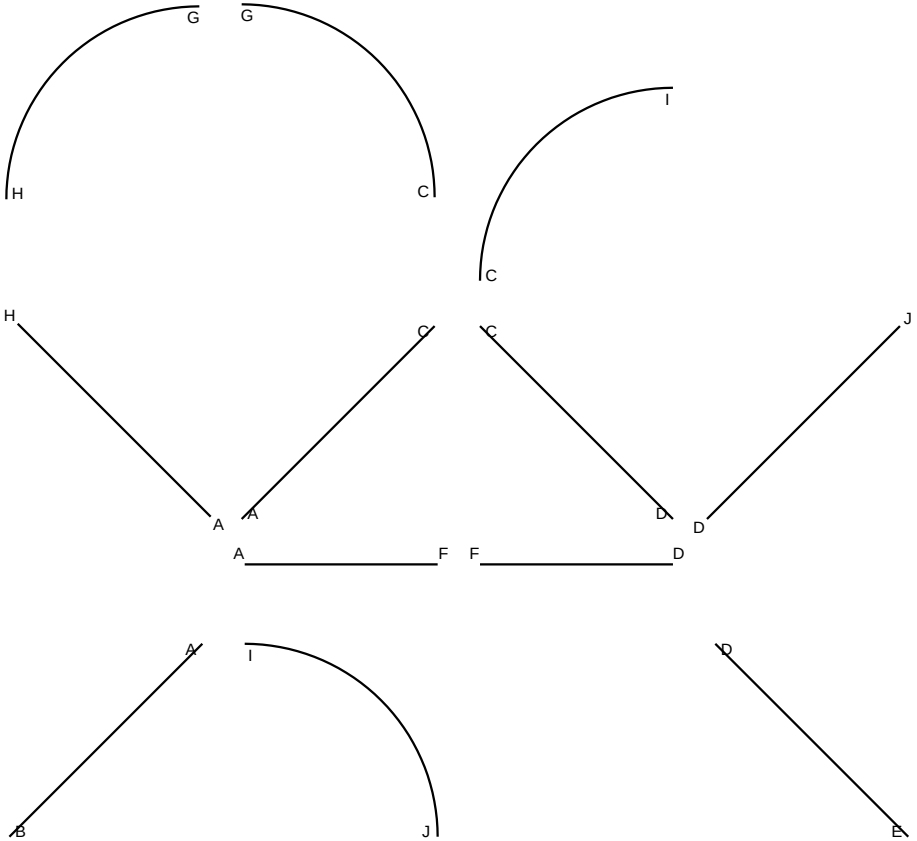
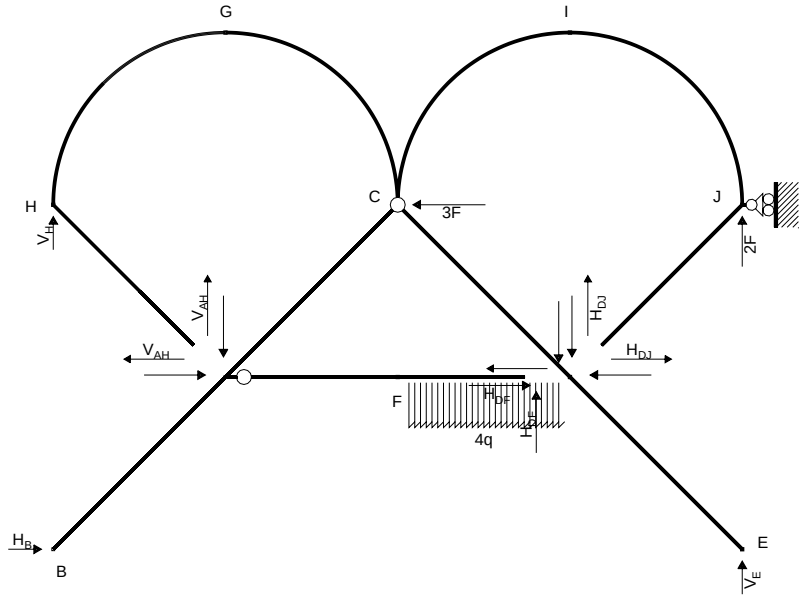
Carichi e deformazioni date hanno verso efficace in disegno.
Calcolare reazioni vincolari della struttura e delle aste.
Tracciare i diagrammi delle azioni interne nelle aste.
Piano di scorrimento del vincolo con inclinazione assegnata.











EQUAZIONI DI EQUILIBRIO

Traslazione verticale globale

$V_E + V_H = -2F + 4qb$

Rotazione globale intorno a J

$2H_B b - 4V_H b = -6qb^2$

Rotazione intorno a C: aste CA AB AF FD

$2H_B b + 2H_{DF} b + 2V_{AH} b = 2qb^2$

Rotazione intorno a C: aste CD DE

$2V_E b - 2H_{DF} b - 2H_{DJ} b = 0$

Rotazione intorno a C: aste CG GH HA

$-2V_H b - 2V_{AH} b = 0$

Rotazione intorno a A: aste AF FD

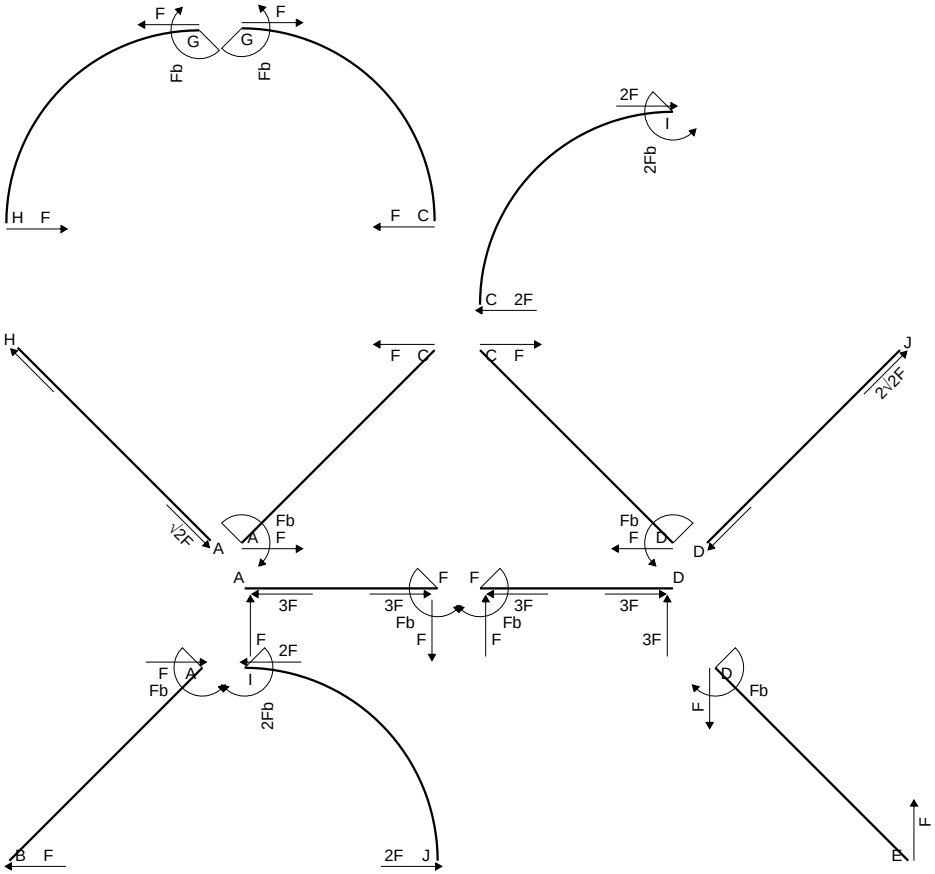
$2H_{DF} b = 6qb^2$

Matrice di equilibrio

	$H_B b$	$V_E b$	$V_H b$	$H_{DF} b$	$V_{AH} b$	$H_{DJ} b$		Fb	qb^2
v_J	0	1	1	0	0	0		-2	4
φ_J	2	0	-4	0	0	0		0	-6
φ_{CA}	2	0	0	2	2	0	=	0	2
φ_{CD}	0	2	0	-2	0	-2		0	0
φ_{CG}	0	0	-2	0	-2	0		0	0
φ_{AF}	0	0	0	2	0	0		0	6

Soluzione del sistema

		Fb	qb^2
$V_E b$		-2	3
$H_B b$		0	-1
$V_H b$	=	0	1
$H_{DF} b$		0	3
$H_{DJ} b$		-2	0
$V_{AH} b$		0	-1


F
G
G
F
Fb
Fb
H F
F C
2F
I
2Fb
C 2F
H
F C
C F
J
√2F
A
Fb
F
Fb
F
D
A
F
F
D
3F
3F
3F
3F
3F
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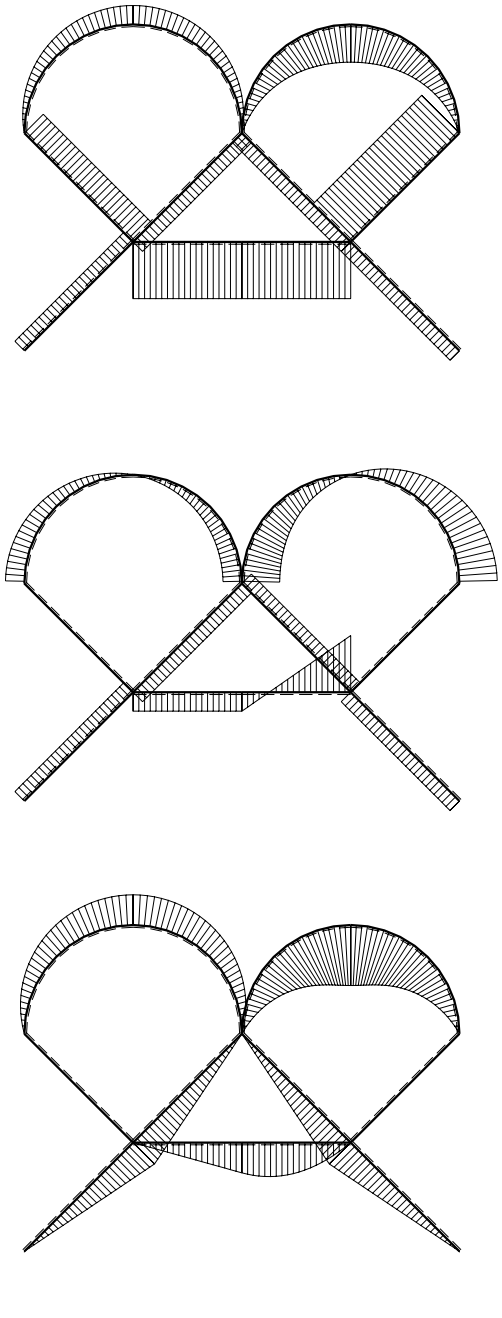
B F
2F J
E
F


4 F
4 F
2.5 Fb

Es.N.003

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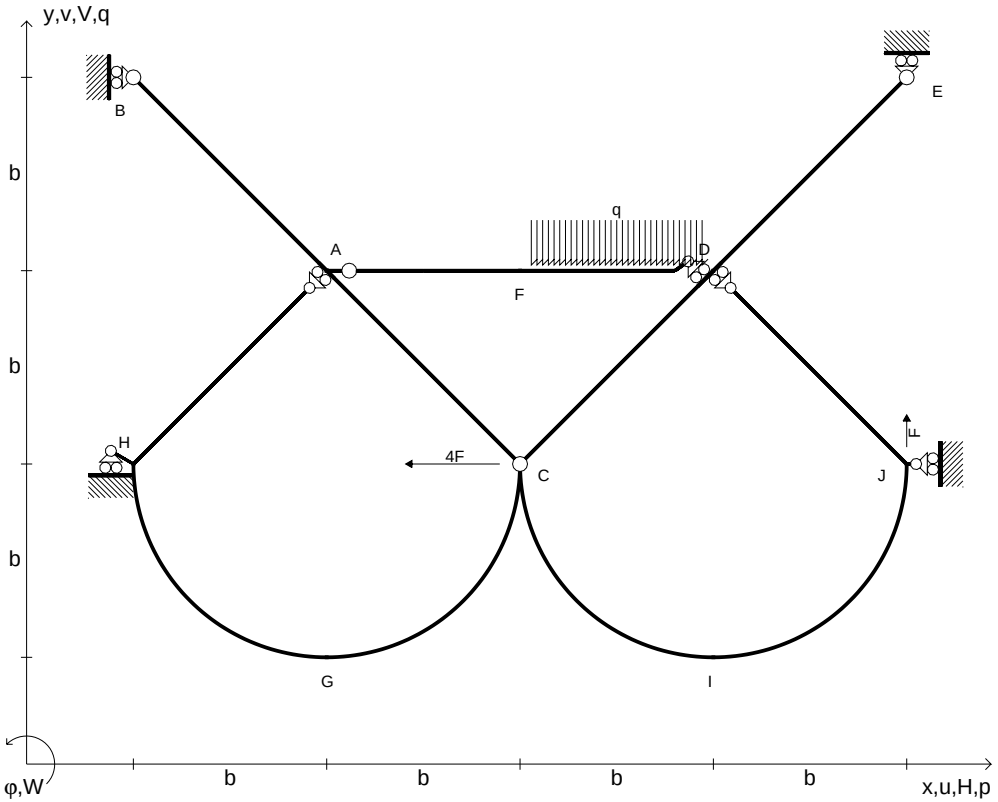

$H_C = -4F$
$V_J = F$
$q_{FD} = -q = -F/b$

1 1 Piano AH

1 1 Piano DF

1 1 Piano DJ

.
Svolgere l'analisi cinematica geometrica ed analitica.
Determinare matrice di congruenza e di equilibrio.
Determinare le reazioni vincolari a terra col PLV (Le=0).
Determinare le azioni interne in A (asta AC) col PLV (Le=0).
.
Carichi e deformazioni date hanno verso efficace in disegno.
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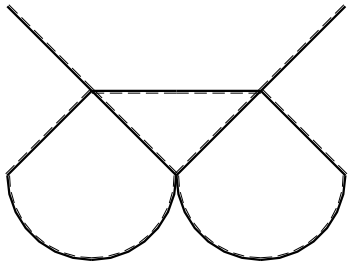
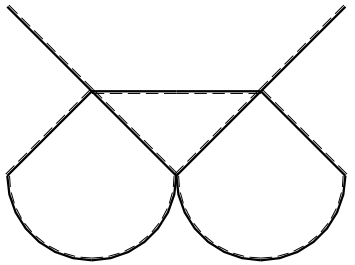
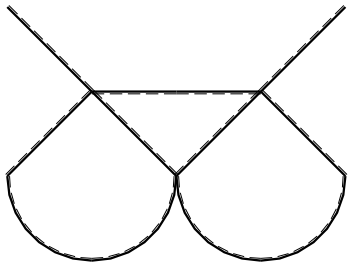
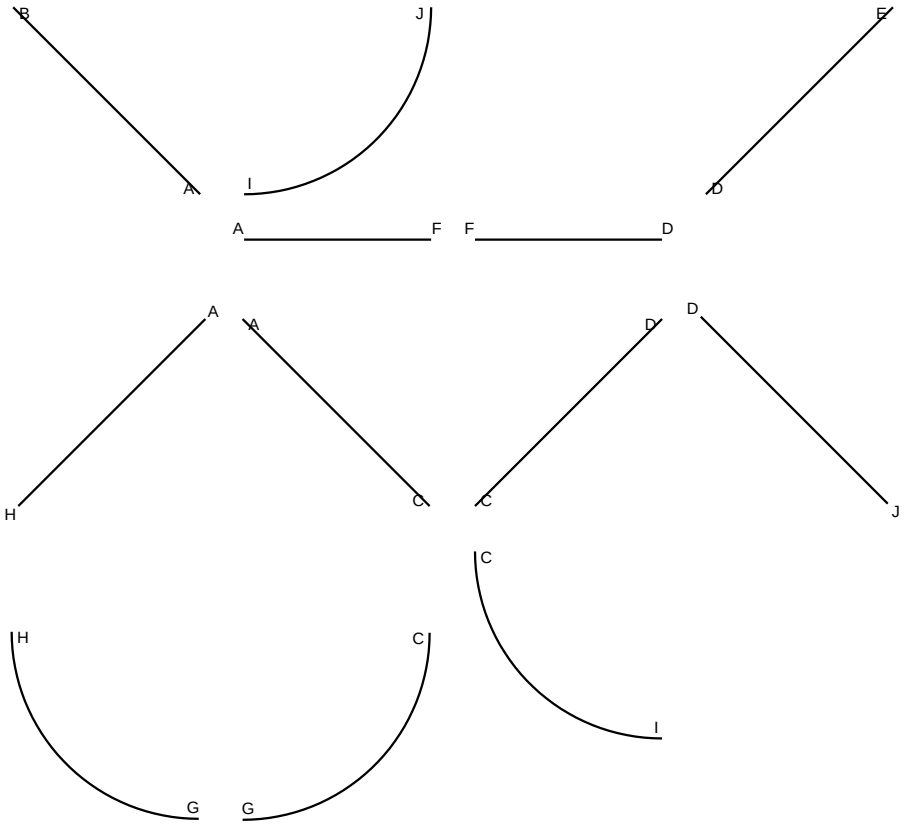
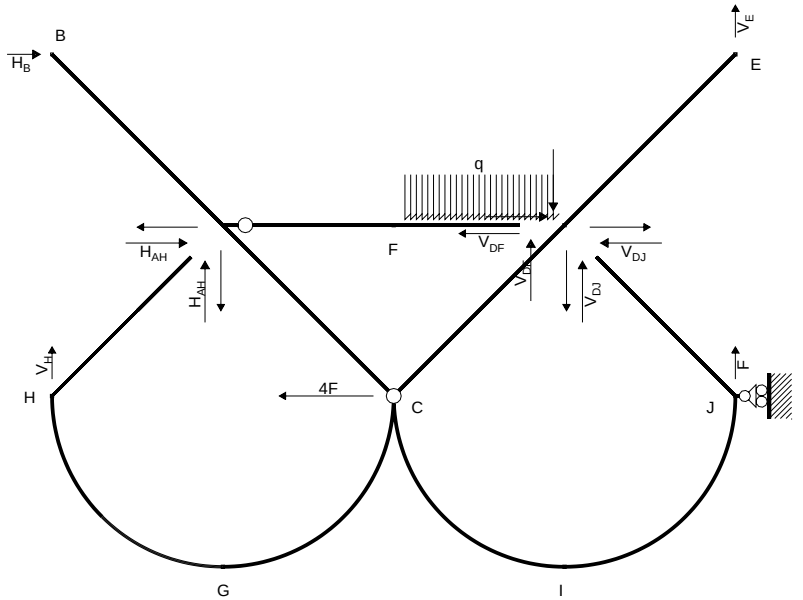
Tracciare i diagrammi delle azioni interne nelle aste.
Piano di scorrimento del vincolo con inclinazione assegnata.











EQUAZIONI DI EQUILIBRIO

Traslazione verticale globale

$V_E + V_H = -F + qb$

Rotazione globale intorno a J

$-2H_B b - 4V_H b = -3/2 qb^2$

Rotazione intorno a C: aste CA AB AF FD

$-2H_B b + 2V_{DF} b + 2H_{AH} b = 1/2 qb^2$

Rotazione intorno a C: aste CD DE

$2V_E b - 2V_{DF} b - 2V_{DJ} b = 0$

Rotazione intorno a C: aste CG GH HA

$-2V_H b - 2H_{AH} b = 0$

Rotazione intorno a A: aste AF FD

$2V_{DF} b = 3/2 qb^2$

Matrice di equilibrio

$$\begin{array}{c} \\ v_J \\ \varphi_J \\ \varphi_{CA} \\ \varphi_{CD} \\ \varphi_{CG} \\ \varphi_{AF} \end{array} \begin{bmatrix} H_B b & V_E b & V_H b & V_{DF} b & H_{AH} b & V_{DJ} b \\ 0 & 1 & 1 & 0 & 0 & 0 \\ -2 & 0 & -4 & 0 & 0 & 0 \\ -2 & 0 & 0 & 2 & 2 & 0 \\ 0 & 2 & 0 & -2 & 0 & -2 \\ 0 & 0 & -2 & 0 & -2 & 0 \\ 0 & 0 & 0 & 2 & 0 & 0 \end{bmatrix} = \begin{bmatrix} Fb & qb^2 \\ -1 & 1 \\ 0 & -3/2 \\ 0 & 1/2 \\ 0 & 0 \\ 0 & 0 \\ 0 & 3/2 \end{bmatrix}$$

Soluzione del sistema

$$\begin{bmatrix} V_E b \\ H_B b \\ V_H b \\ V_{DF} b \\ V_{DJ} b \\ H_{AH} b \end{bmatrix} = \begin{array}{c} \begin{bmatrix} Fb & qb^2 \end{bmatrix} \\ \begin{bmatrix} -1 & 3/4 \\ 0 & 1/4 \\ 0 & 1/4 \\ 0 & 3/4 \\ -1 & 0 \\ 0 & -1/4 \end{bmatrix} \end{array}$$

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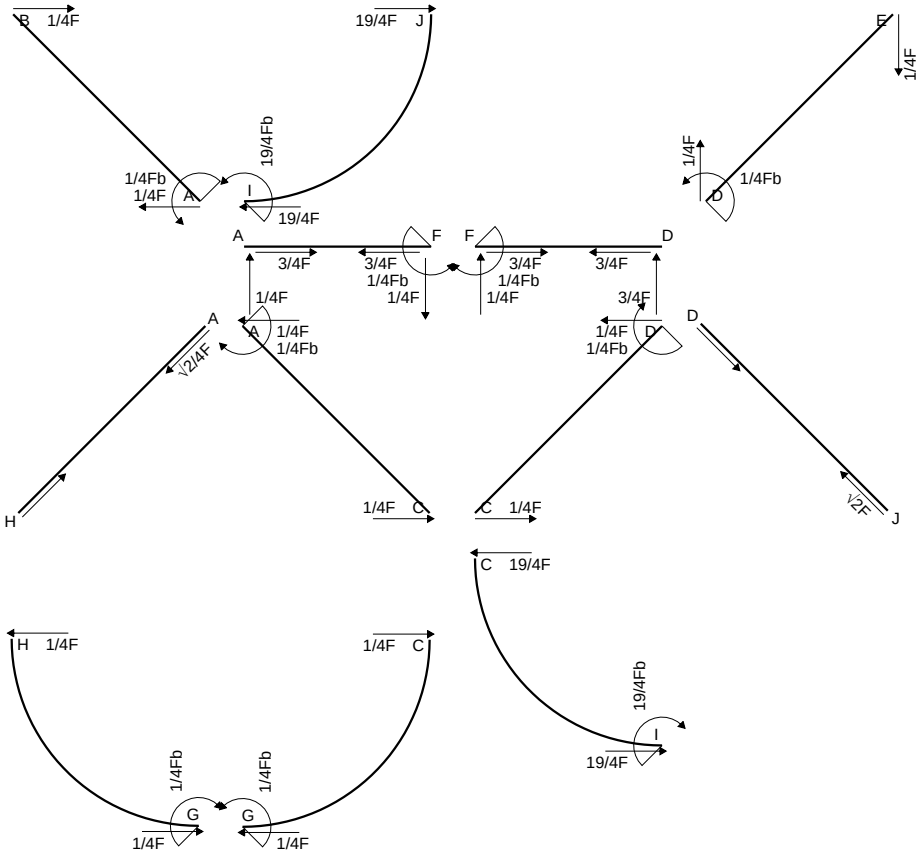
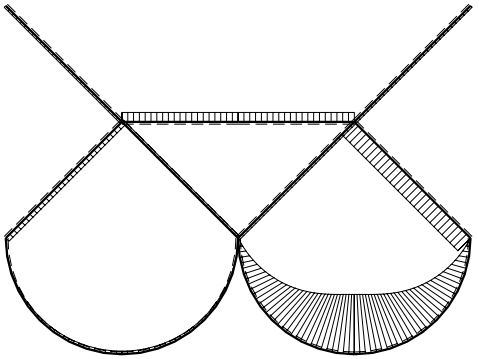
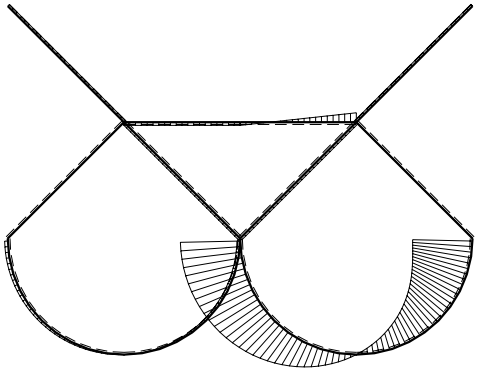
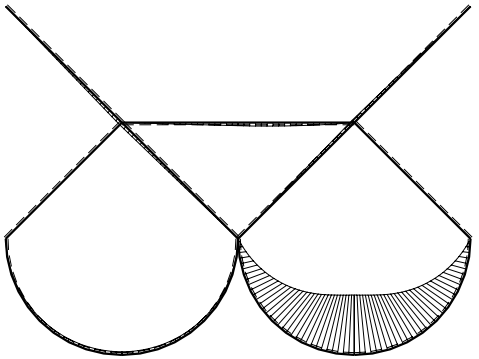




6 F



6 F



6 Fb

Es.N.004

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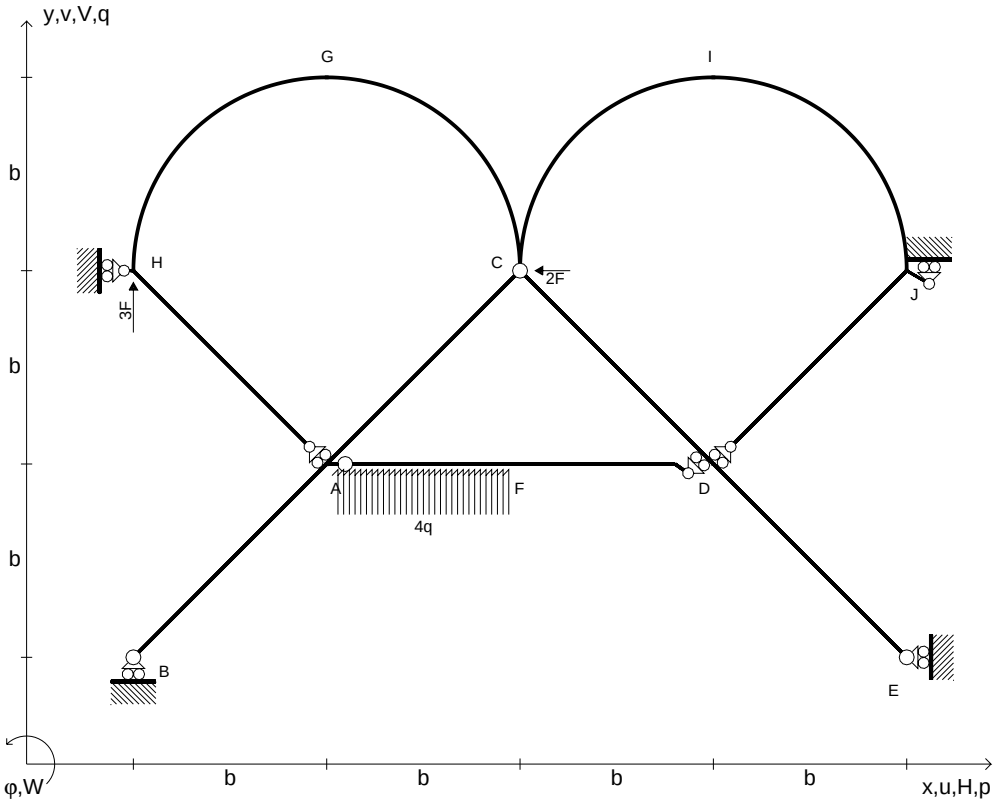


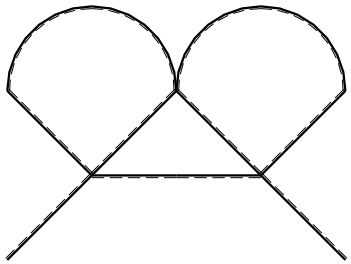
H_C = -2F
V_H = 3F
q_{AF} = 4q = 4F/b

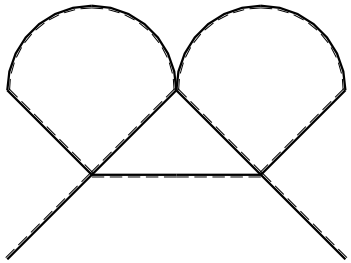
Piano AH

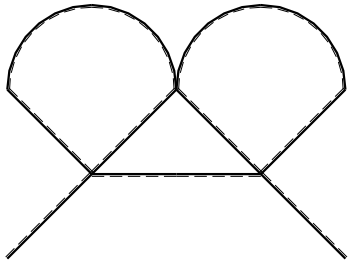
Piano DJ

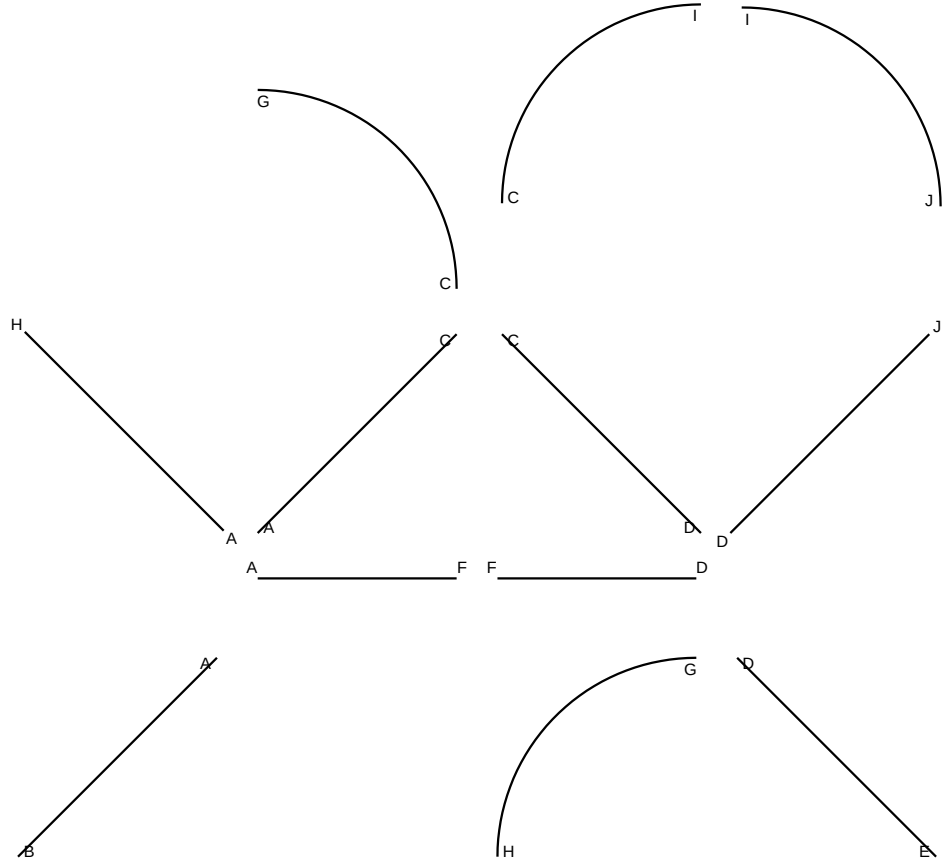
Piano DF

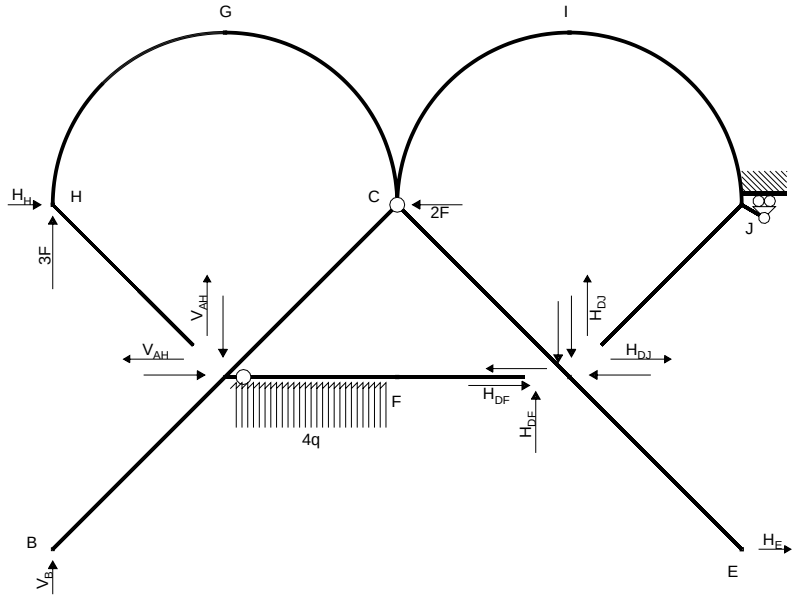
.
Svolgere l'analisi cinematica geometrica ed analitica.
Determinare matrice di congruenza e di equilibrio.
Determinare le reazioni vincolari a terra col PLV (Le=0).
Determinare le azioni interne in A (asta AC) col PLV (Le=0).
.
Carichi e deformazioni date hanno verso efficace in disegno.
Calcolare reazioni vincolari della struttura e delle aste.
Tracciare i diagrammi delle azioni interne nelle aste.
Piano di scorrimento del vincolo con inclinazione assegnata.











EQUAZIONI DI EQUILIBRIO

Traslazione orizzontale globale

$H_E + H_H = 2F$

Rotazione globale intorno a J

$-4V_B b + 2H_E b = 12Fb + 10qb^2$

Rotazione intorno a C: aste CA AB AF FD

$-2V_B b + 2H_{DF} b + 2V_{AH} b = 2qb^2$

Rotazione intorno a C: aste CD DE

$2H_E b - 2H_{DF} b - 2H_{DJ} b = 0$

Rotazione intorno a C: aste CG GH HA

$-2V_{AH} b = 6Fb$

Rotazione intorno a A: aste AF FD

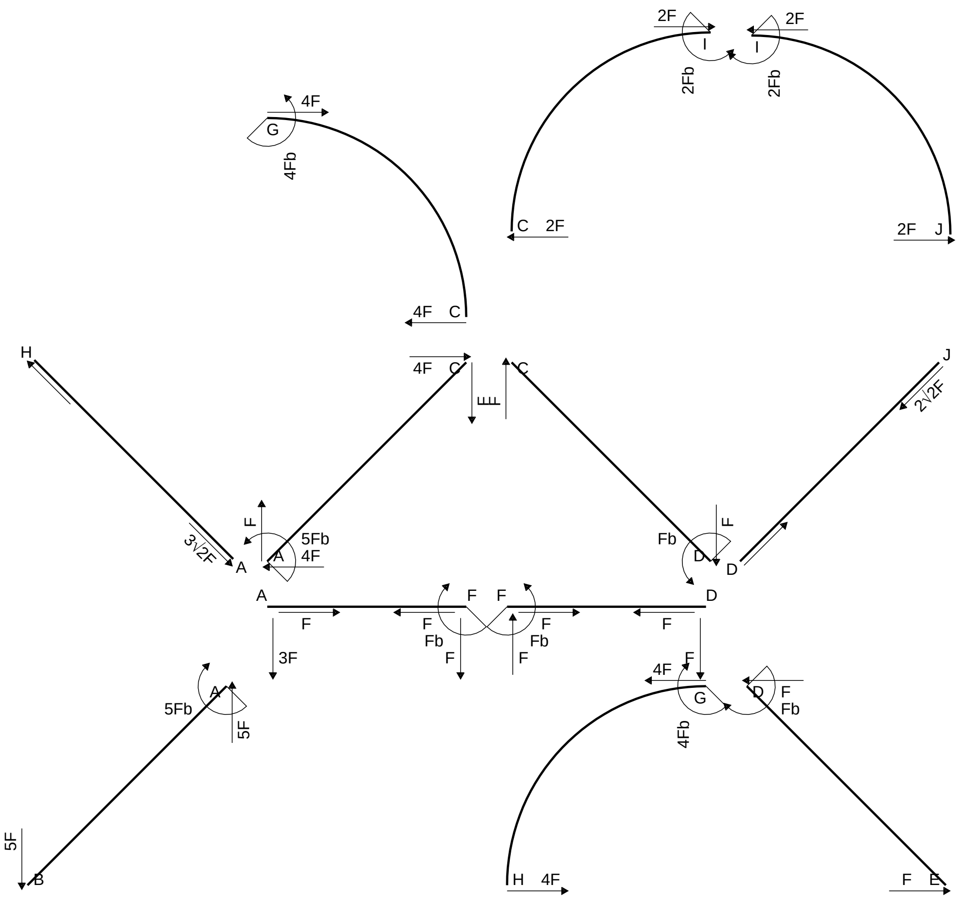
$2H_{DF} b = -2qb^2$

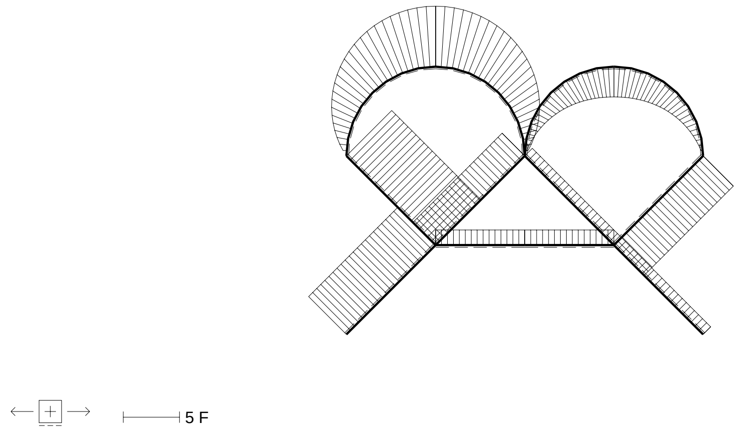
Matrice di equilibrio

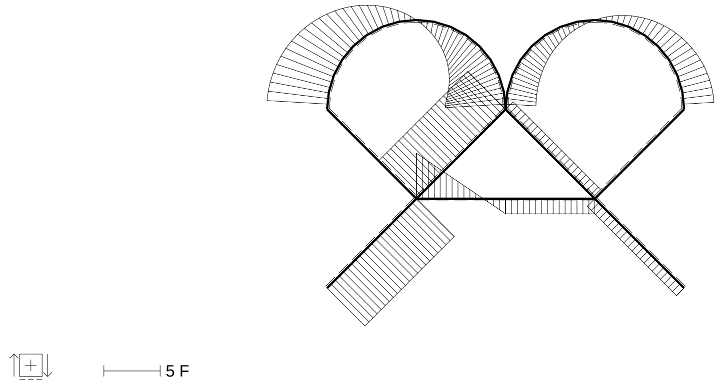
$$\begin{array}{c} \\ u_J \\ \varphi_J \\ \varphi_{CA} \\ \varphi_{CD} \\ \varphi_{CG} \\ \varphi_{AF} \end{array} \begin{bmatrix} V_B b & H_E b & H_H b & H_{DF} b & V_{AH} b & H_{DJ} b \\ 0 & 1 & 1 & 0 & 0 & 0 \\ -4 & 2 & 0 & 0 & 0 & 0 \\ -2 & 0 & 0 & 2 & 2 & 0 \\ 0 & 2 & 0 & -2 & 0 & -2 \\ 0 & 0 & 0 & 0 & -2 & 0 \\ 0 & 0 & 0 & 2 & 0 & 0 \end{bmatrix} = \begin{bmatrix} Fb & qb^2 \\ 2 & 0 \\ 12 & 10 \\ 0 & 2 \\ 0 & 0 \\ 6 & 0 \\ 0 & -2 \end{bmatrix}$$

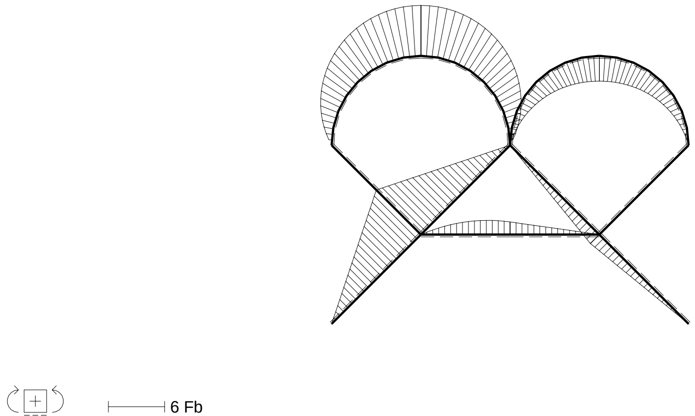
Soluzione del sistema

$$\begin{bmatrix} H_E b \\ V_B b \\ H_H b \\ H_{DF} b \\ V_{AH} b \\ H_{DJ} b \end{bmatrix} = \begin{bmatrix} Fb & qb^2 \\ 0 & 1 \\ -3 & -2 \\ 2 & -1 \\ 0 & -1 \\ -3 & 0 \\ 0 & 2 \end{bmatrix}$$









Es.N.005

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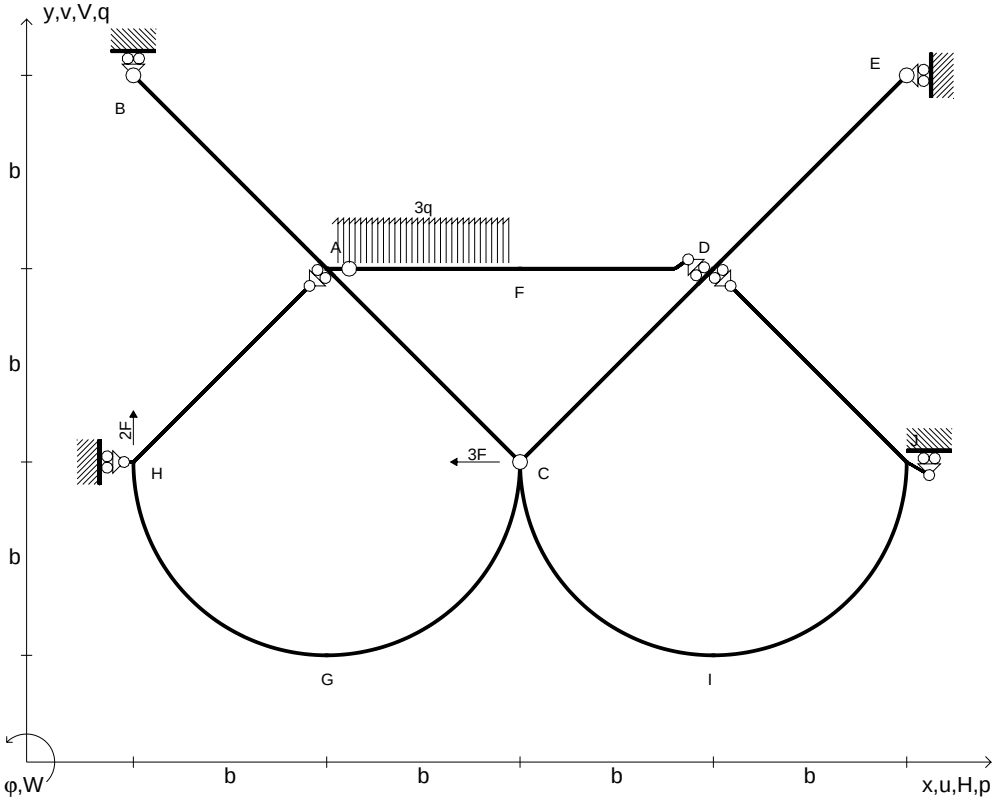


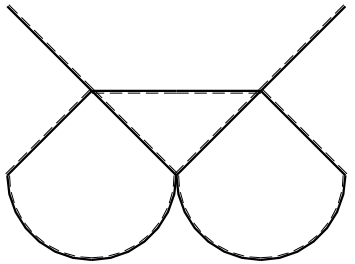
$H_C = -3F$
$V_H = 2F$
$q_{AF} = 3q = 3F/b$

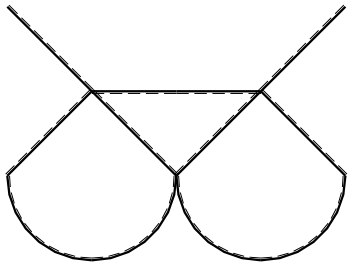
1 1 Piano AH

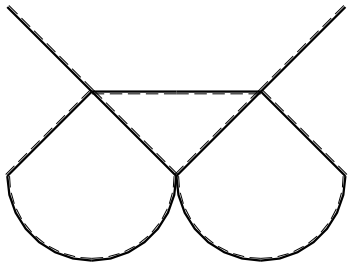
1 1 Piano DF

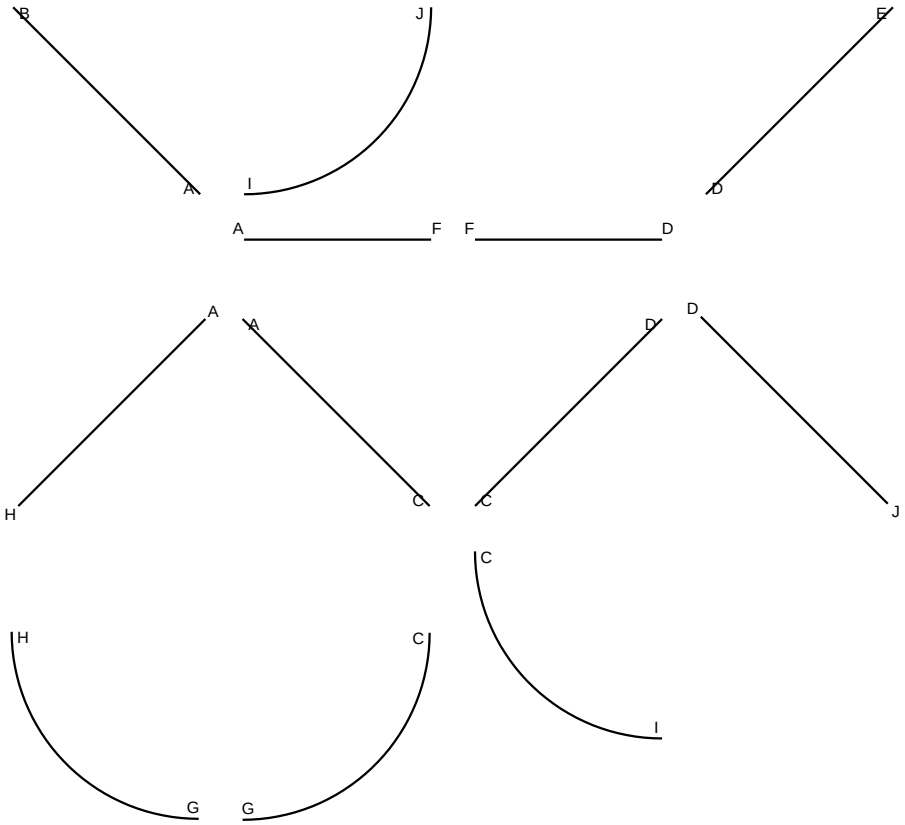
1 1 Piano DJ

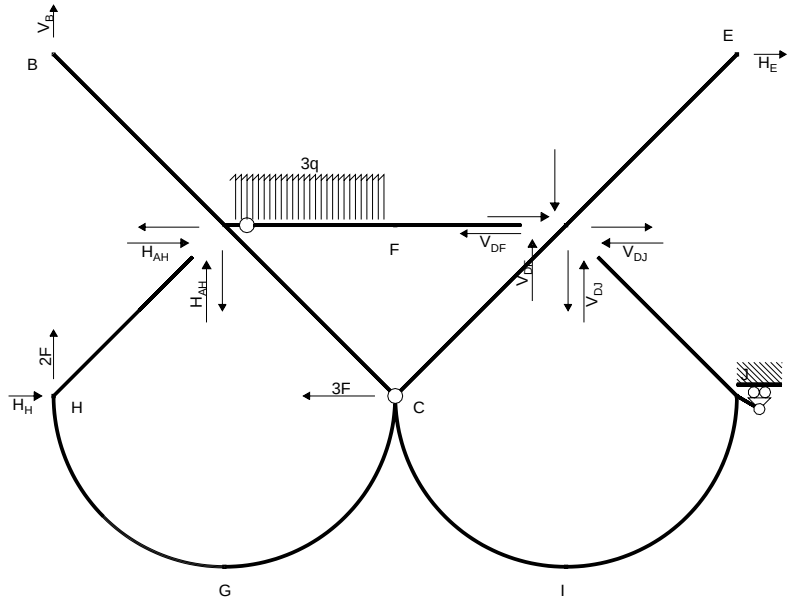
.
Svolgere l'analisi cinematica geometrica ed analitica.
Determinare matrice di congruenza e di equilibrio.
Determinare le reazioni vincolari a terra col PLV (Le=0).
Determinare le azioni interne in A (asta AC) col PLV (Le=0).
.
Carichi e deformazioni date hanno verso efficace in disegno.
Calcolare reazioni vincolari della struttura e delle aste.
Tracciare i diagrammi delle azioni interne nelle aste.
Piano di scorrimento del vincolo con inclinazione assegnata.











EQUAZIONI DI EQUILIBRIO

Traslazione orizzontale globale

$H_E + H_H = 3F$

Rotazione globale intorno a J

$-4V_B b - 2H_E b = 8Fb + 15/2qb^2$

Rotazione intorno a C: aste CA AB AF FD

$-2V_B b + 2V_{DF} b + 2H_{AH} b = 3/2qb^2$

Rotazione intorno a C: aste CD DE

$-2H_E b - 2V_{DF} b - 2V_{DJ} b = 0$

Rotazione intorno a C: aste CG GH HA

$-2H_{AH} b = 4Fb$

Rotazione intorno a A: aste AF FD

$2V_{DF} b = -3/2qb^2$

Matrice di equilibrio

$$\begin{array}{c} \\ u_J \\ \varphi_J \\ \varphi_{CA} \\ \varphi_{CD} \\ \varphi_{CG} \\ \varphi_{AF} \end{array} \begin{bmatrix} V_B b & H_E b & H_H b & V_{DF} b & H_{AH} b & V_{DJ} b \\ 0 & 1 & 1 & 0 & 0 & 0 \\ -4 & -2 & 0 & 0 & 0 & 0 \\ -2 & 0 & 0 & 2 & 2 & 0 \\ 0 & -2 & 0 & -2 & 0 & -2 \\ 0 & 0 & 0 & 0 & -2 & 0 \\ 0 & 0 & 0 & 2 & 0 & 0 \end{bmatrix} = \begin{bmatrix} Fb & qb^2 \\ 3 & 0 \\ 8 & 15/2 \\ 0 & 3/2 \\ 0 & 0 \\ 4 & 0 \\ 0 & -3/2 \end{bmatrix}$$

Soluzione del sistema

$$\begin{bmatrix} H_E b \\ V_B b \\ H_H b \\ V_{DF} b \\ H_{AH} b \\ V_{DJ} b \end{bmatrix} = \begin{array}{c} \begin{bmatrix} Fb & qb^2 \end{bmatrix} \\ \begin{bmatrix} 0 & -3/4 \\ -2 & -3/2 \\ 3 & 3/4 \\ 0 & -3/4 \\ -2 & 0 \\ 0 & 3/2 \end{bmatrix} \end{array}$$

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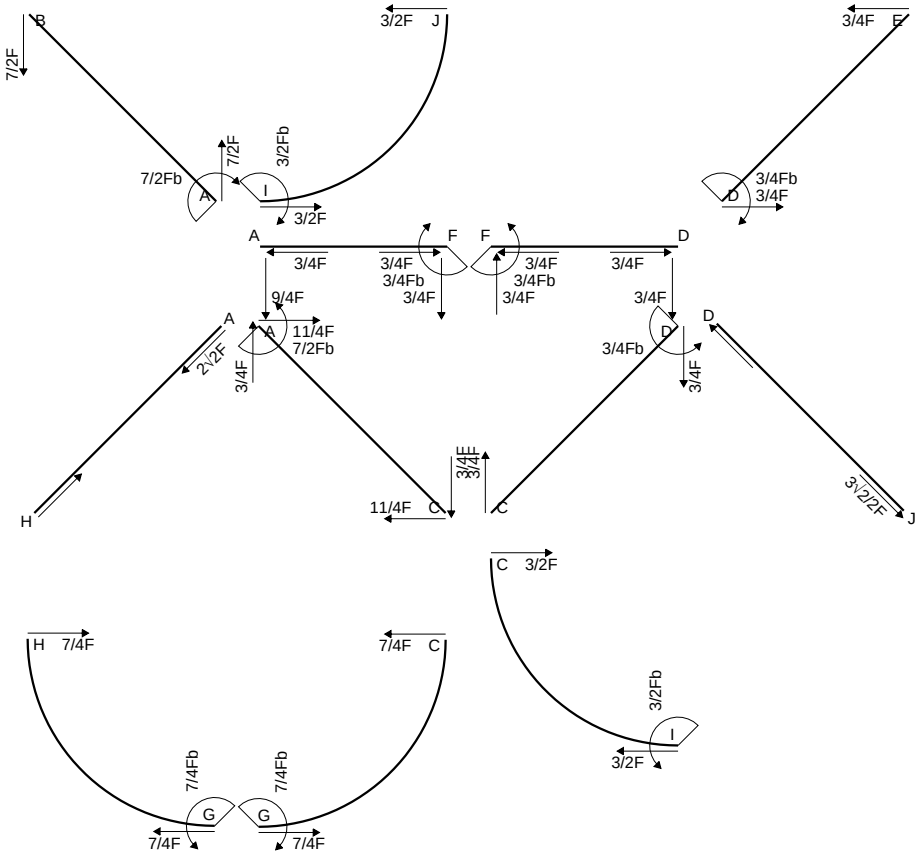
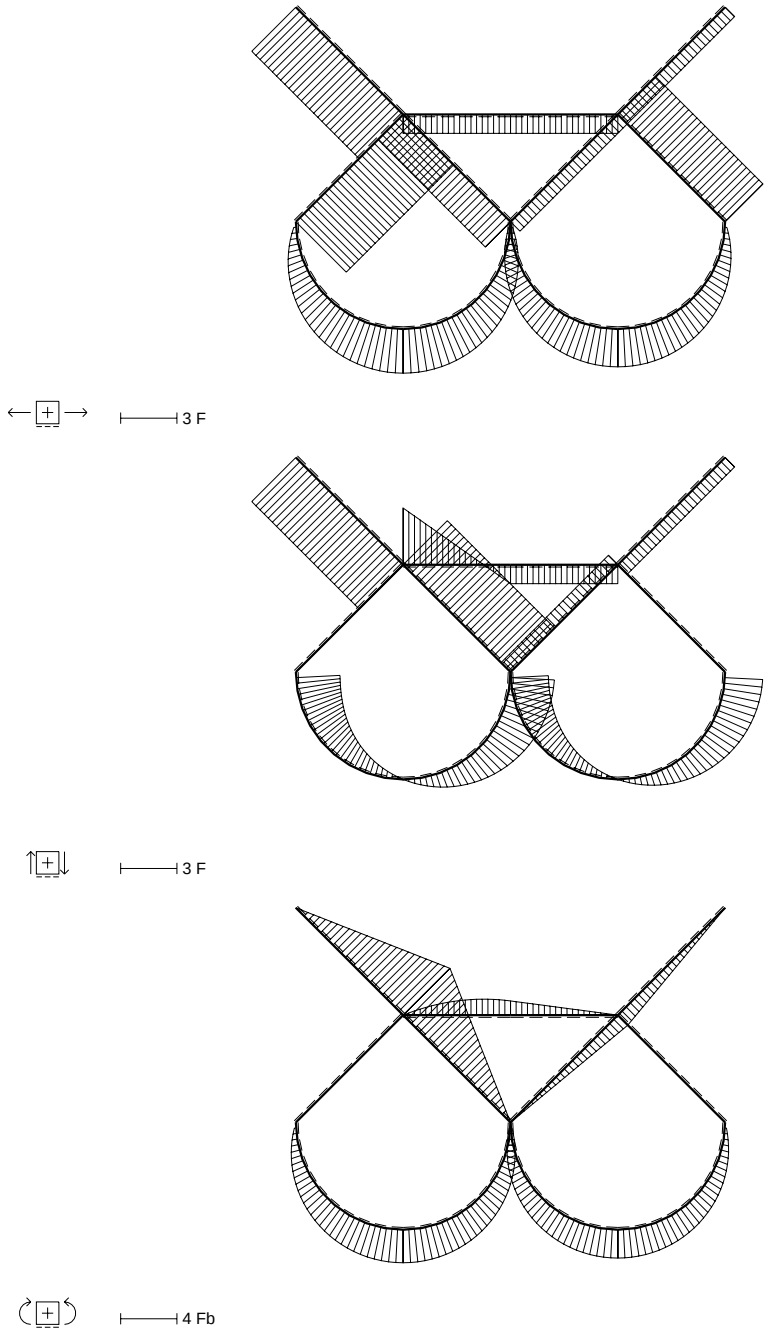

B
7/2F
3/2F J
3/4F E
7/2Fb
7/2F
3/2Fb
A
I
3/2F
3/4Fb
3/4F
D
A F F D
3/4F
3/4F
3/4Fb
3/4F
3/4F
3/4F
3/4F
3/4F
3/4Fb
9/4F
A
A
11/4F
7/2Fb
D
D
2^1/2F
3/4F
3/4F
3/4F
3/4F
H
11/4F C
C
3^1/2F
J
C 3/2F
H 7/4F
7/4F C
3/2Fb
I
3/2F
7/4Fb
7/4Fb
G
G
7/4F
7/4F


3 F
3 F
4 Fb

Es.N.006

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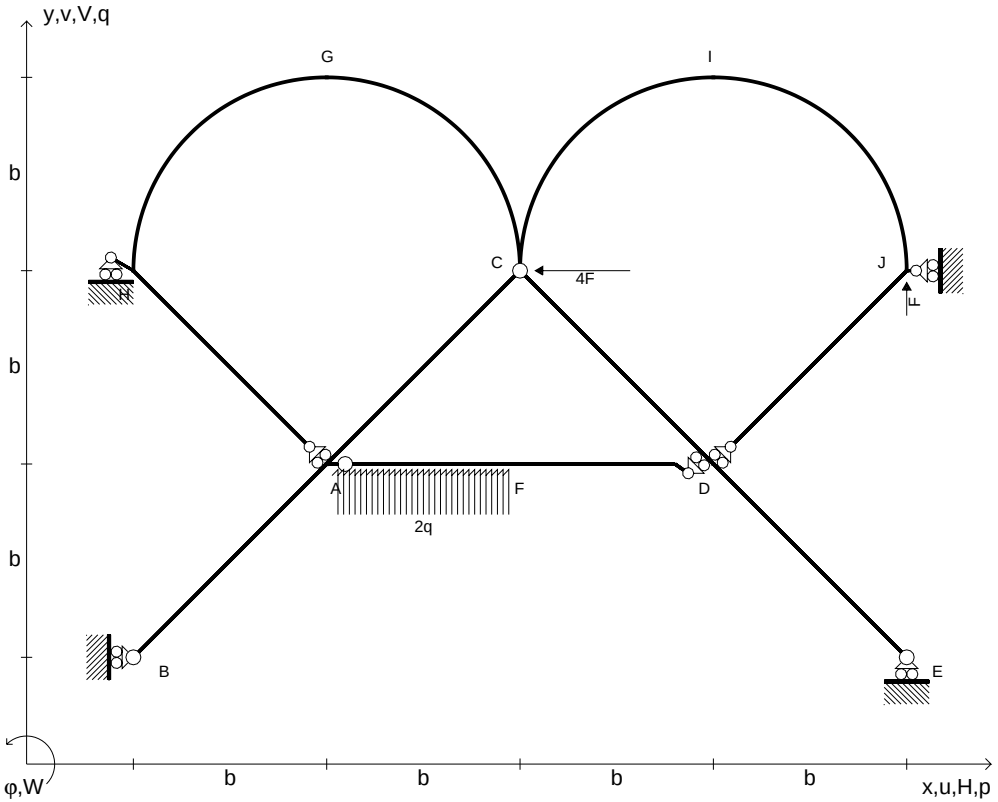

$H_C = -4F$
$V_J = F$
$q_{AF} = 2q = 2F/b$

Piano AH

Piano DJ

Piano DF

.
Svolgere l'analisi cinematica geometrica ed analitica.
Determinare matrice di congruenza e di equilibrio.
Determinare le reazioni vincolari a terra col PLV (Le=0).
Determinare le azioni interne in A (asta AC) col PLV (Le=0).
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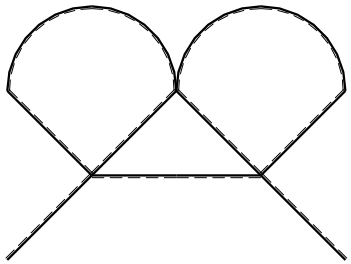
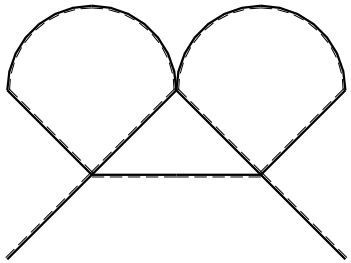
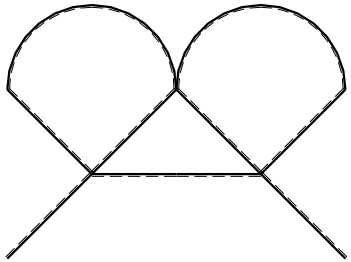
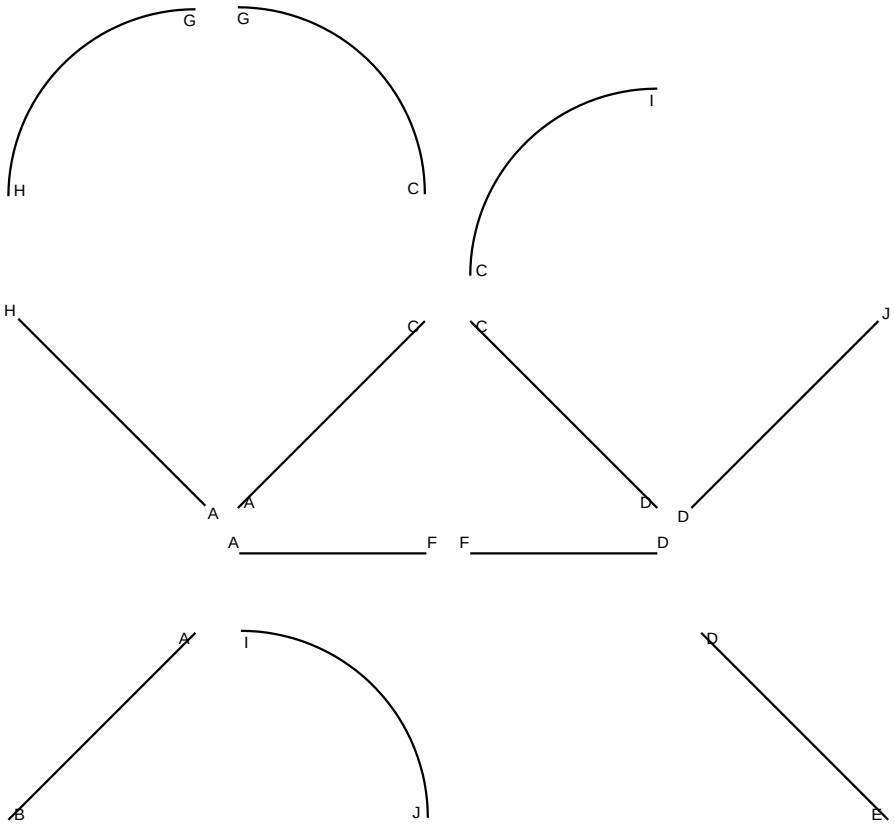
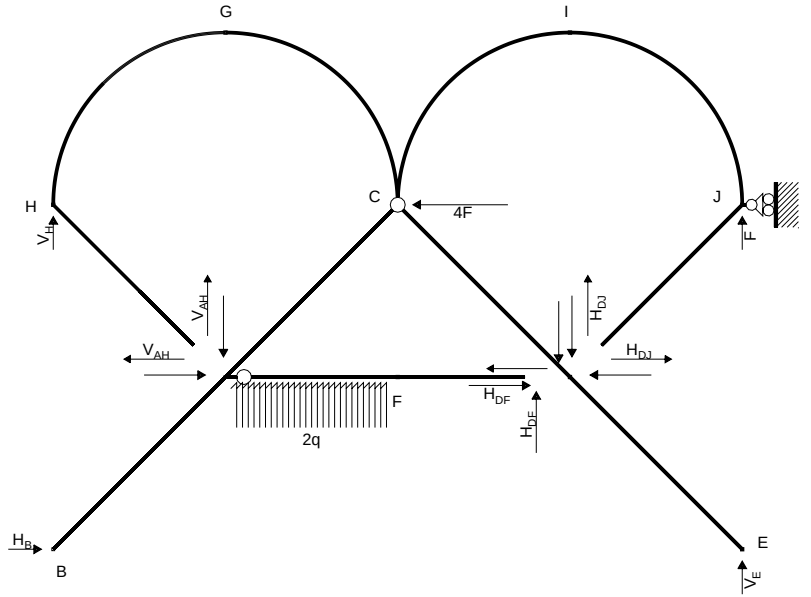
Carichi e deformazioni date hanno verso efficace in disegno.
Calcolare reazioni vincolari della struttura e delle aste.
Tracciare i diagrammi delle azioni interne nelle aste.
Piano di scorrimento del vincolo con inclinazione assegnata.











EQUAZIONI DI EQUILIBRIO

Traslazione verticale globale

$V_E + V_H = -F - 2qb$

Rotazione globale intorno a J

$2H_B b - 4V_H b = 5qb^2$

Rotazione intorno a C: aste CA AB AF FD

$2H_B b + 2H_{DF} b + 2V_{AH} b = qb^2$

Rotazione intorno a C: aste CD DE

$2V_E b - 2H_{DF} b - 2H_{DJ} b = 0$

Rotazione intorno a C: aste CG GH HA

$-2V_H b - 2V_{AH} b = 0$

Rotazione intorno a A: aste AF FD

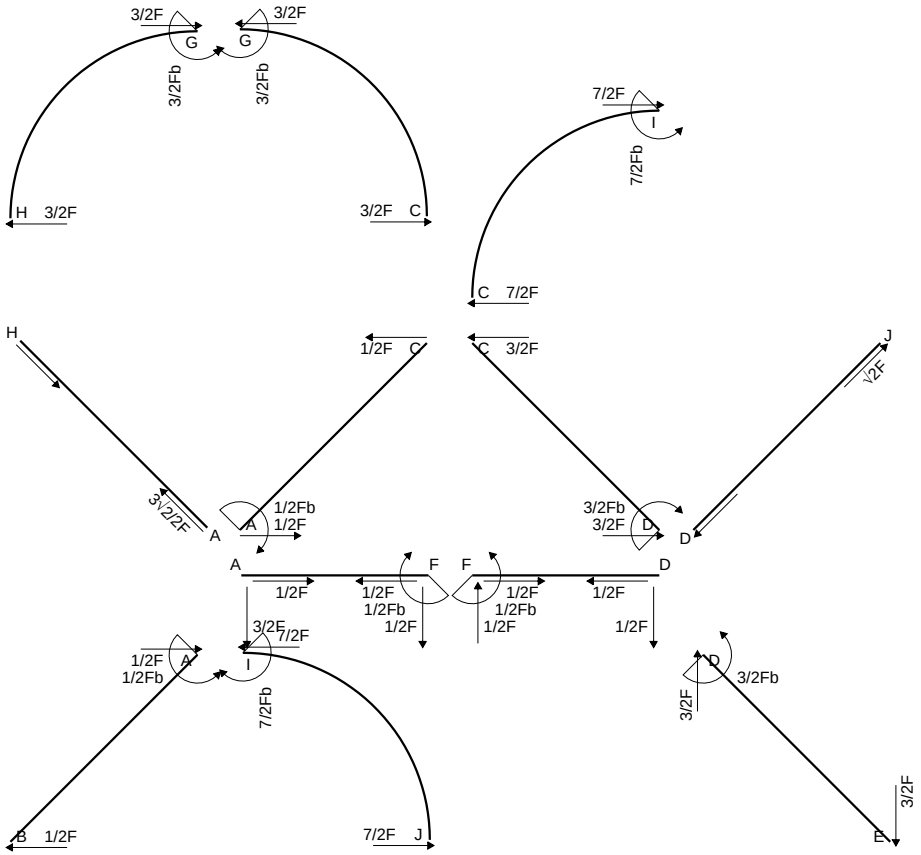
$2H_{DF} b = -qb^2$

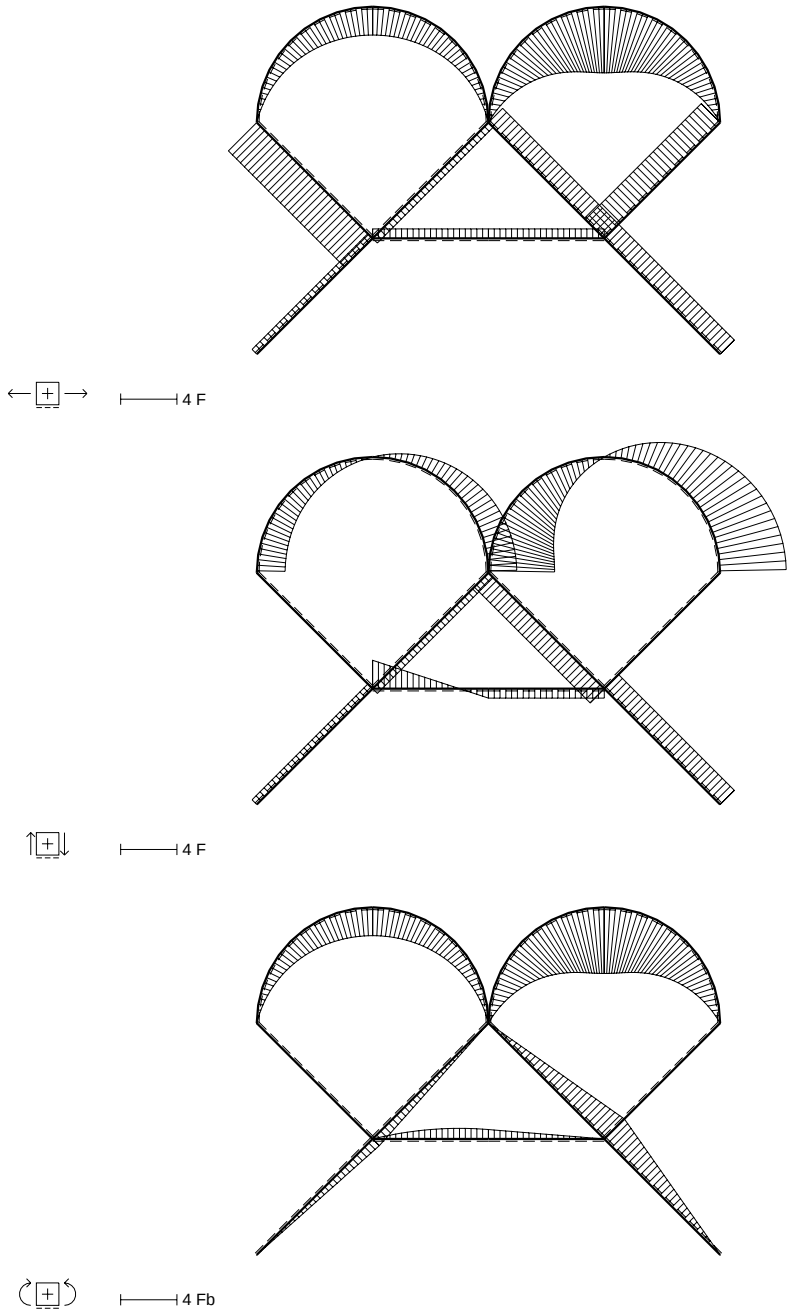
Matrice di equilibrio

$$\begin{array}{c} \\ v_J \\ \varphi_J \\ \varphi_{CA} \\ \varphi_{CD} \\ \varphi_{CG} \\ \varphi_{AF} \end{array} \begin{bmatrix} H_B b & V_E b & V_H b & H_{DF} b & V_{AH} b & H_{DJ} b \\ 0 & 1 & 1 & 0 & 0 & 0 \\ 2 & 0 & -4 & 0 & 0 & 0 \\ 2 & 0 & 0 & 2 & 2 & 0 \\ 0 & 2 & 0 & -2 & 0 & -2 \\ 0 & 0 & -2 & 0 & -2 & 0 \\ 0 & 0 & 0 & 2 & 0 & 0 \end{bmatrix} = \begin{bmatrix} Fb & qb^2 \\ -1 & -2 \\ 0 & 5 \\ 0 & 1 \\ 0 & 0 \\ 0 & 0 \\ 0 & -1 \end{bmatrix}$$

Soluzione del sistema

$$\begin{bmatrix} V_E b \\ H_B b \\ V_H b \\ H_{DF} b \\ H_{DJ} b \\ V_{AH} b \end{bmatrix} = \begin{bmatrix} Fb & qb^2 \\ -1 & -1/2 \\ 0 & -1/2 \\ 0 & -3/2 \\ 0 & -1/2 \\ -1 & 0 \\ 0 & 3/2 \end{bmatrix}$$





Es.N.007

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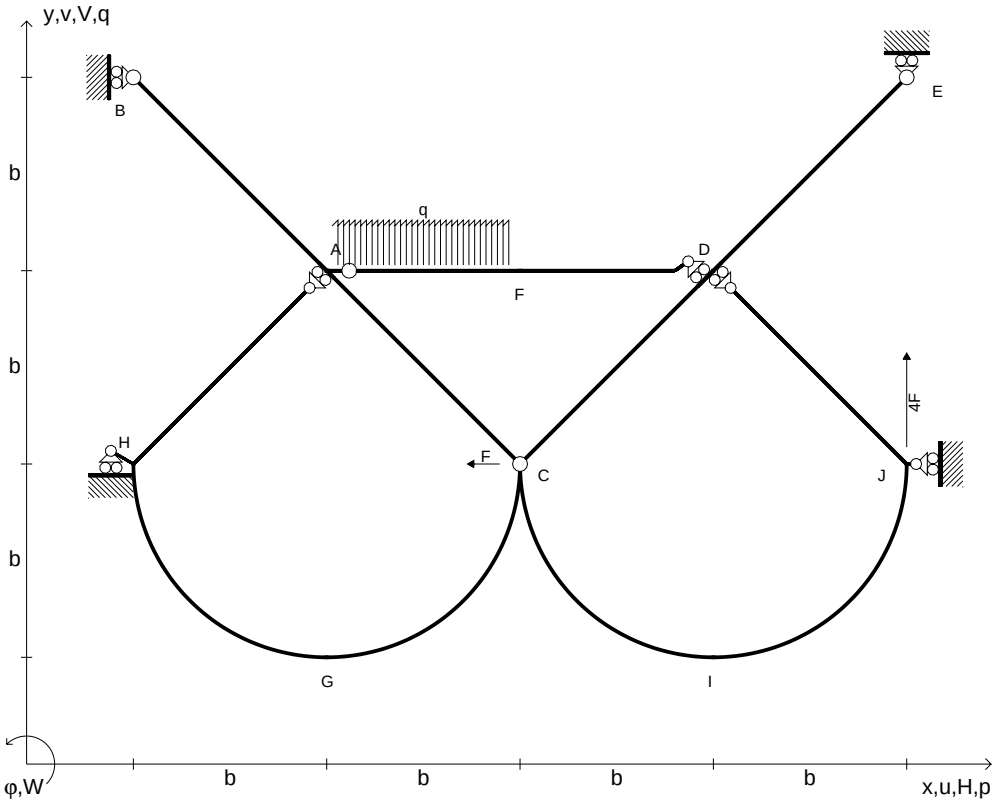

$H_C = -F$
$V_J = 4F$
$q_{AF} = q = F/b$

1 1 Piano AH

1 1 Piano DF

1 1 Piano DJ

.
Svolgere l'analisi cinematica geometrica ed analitica.
Determinare matrice di congruenza e di equilibrio.
Determinare le reazioni vincolari a terra col PLV (Le=0).
Determinare le azioni interne in A (asta AC) col PLV (Le=0).
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Carichi e deformazioni date hanno verso efficace in disegno.
Calcolare reazioni vincolari della struttura e delle aste.
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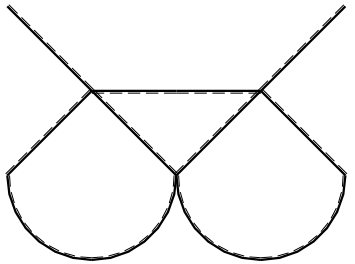
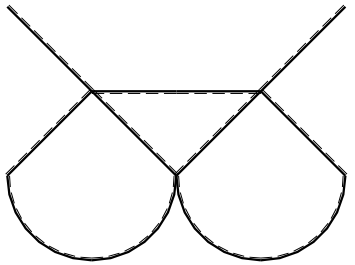
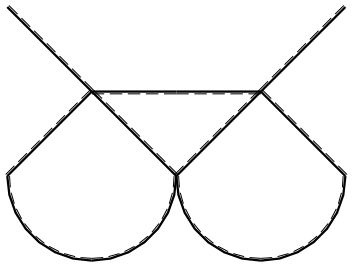
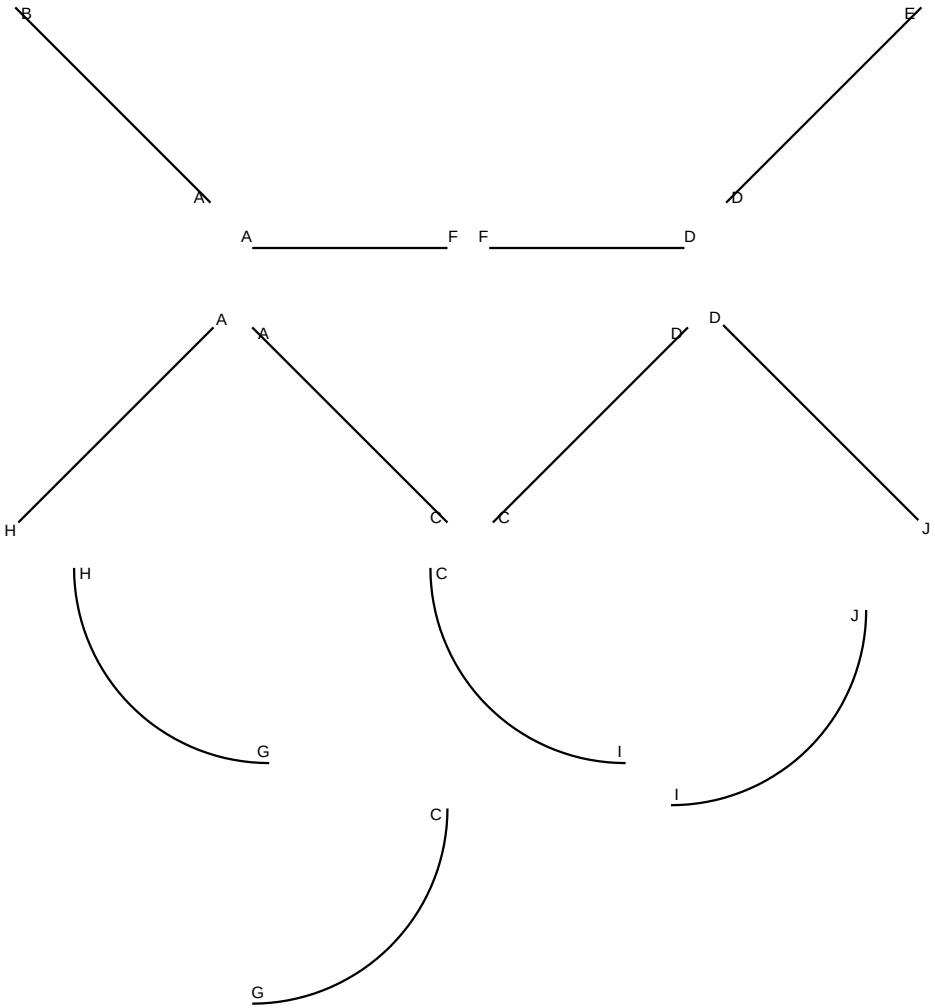
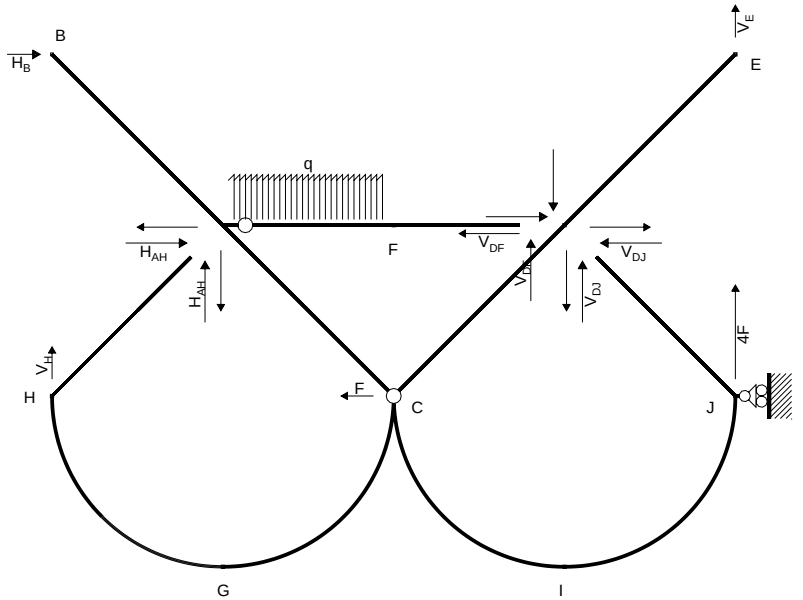
Piano di scorrimento del vincolo con inclinazione assegnata.











EQUAZIONI DI EQUILIBRIO

Traslazione verticale globale

$V_E + V_H = -4F - qb$

Rotazione globale intorno a J

$-2H_B b - 4V_H b = 5/2 qb^2$

Rotazione intorno a C: aste CA AB AF FD

$-2H_B b + 2V_{DF} b + 2H_{AH} b = 1/2 qb^2$

Rotazione intorno a C: aste CD DE

$2V_E b - 2V_{DF} b - 2V_{DJ} b = 0$

Rotazione intorno a C: aste CG GH HA

$-2V_H b - 2H_{AH} b = 0$

Rotazione intorno a A: aste AF FD

$2V_{DF} b = -1/2 qb^2$

Matrice di equilibrio

$$\begin{array}{c} \\ v_J \\ \varphi_J \\ \varphi_{CA} \\ \varphi_{CD} \\ \varphi_{CG} \\ \varphi_{AF} \end{array} \begin{bmatrix} H_B b & V_E b & V_H b & V_{DF} b & H_{AH} b & V_{DJ} b \\ 0 & 1 & 1 & 0 & 0 & 0 \\ -2 & 0 & -4 & 0 & 0 & 0 \\ -2 & 0 & 0 & 2 & 2 & 0 \\ 0 & 2 & 0 & -2 & 0 & -2 \\ 0 & 0 & -2 & 0 & -2 & 0 \\ 0 & 0 & 0 & 2 & 0 & 0 \end{bmatrix} = \begin{bmatrix} Fb & qb^2 \\ -4 & -1 \\ 0 & 5/2 \\ 0 & 1/2 \\ 0 & 0 \\ 0 & 0 \\ 0 & -1/2 \end{bmatrix}$$

Soluzione del sistema

$$\begin{bmatrix} V_E b \\ H_B b \\ V_H b \\ V_{DF} b \\ V_{DJ} b \\ H_{AH} b \end{bmatrix} = \begin{array}{c} \begin{bmatrix} Fb & qb^2 \end{bmatrix} \\ \begin{bmatrix} -4 & -1/4 \\ 0 & 1/4 \\ 0 & -3/4 \\ 0 & -1/4 \\ -4 & 0 \\ 0 & 3/4 \end{bmatrix} \end{array}$$

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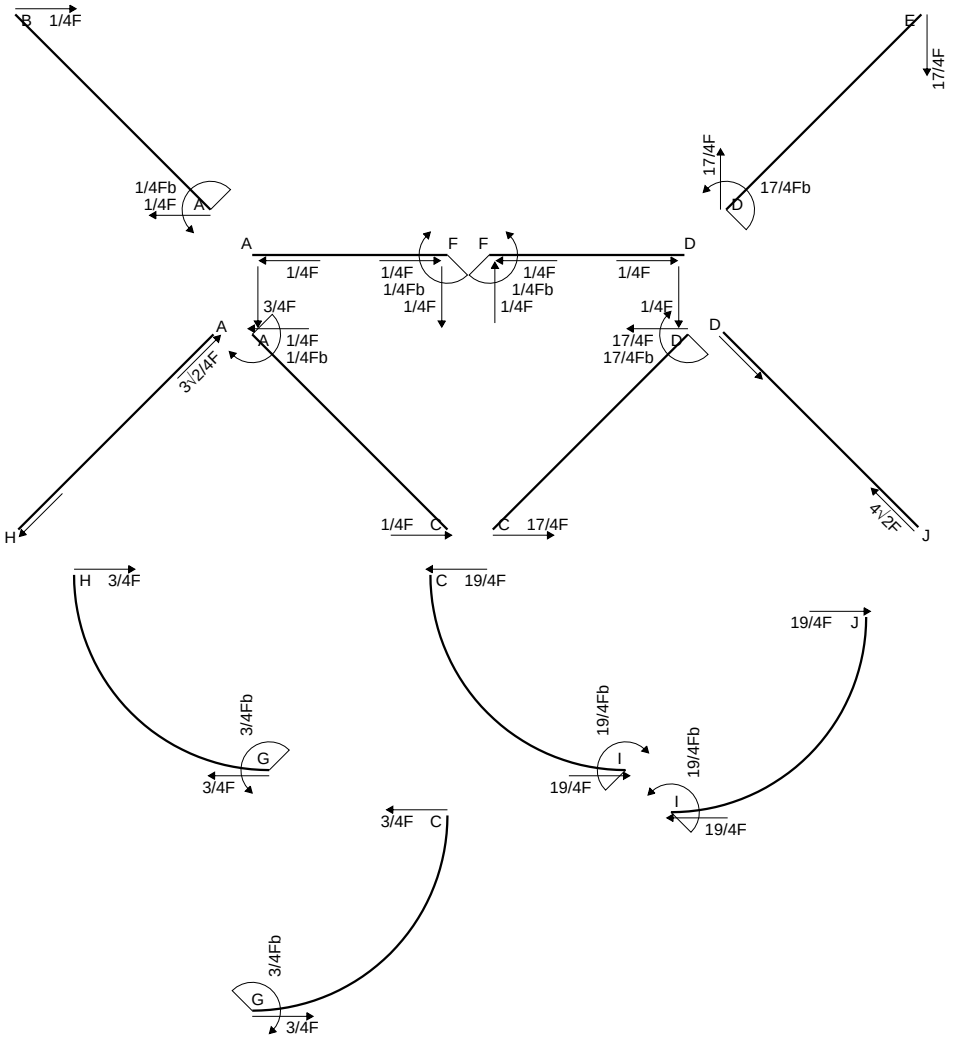
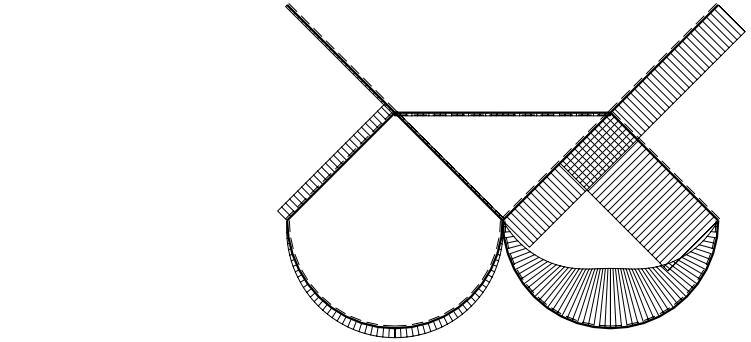
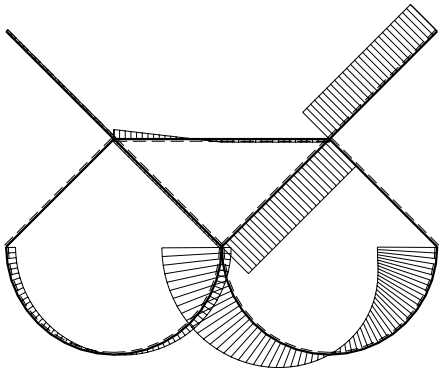
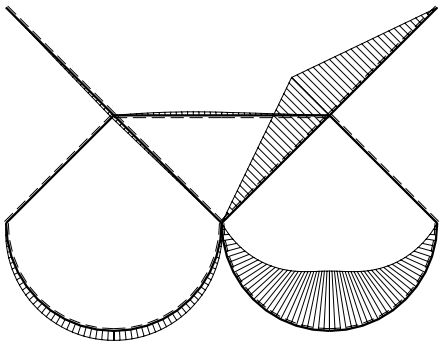




6 F



6 F



6 Fb

Es.N.008

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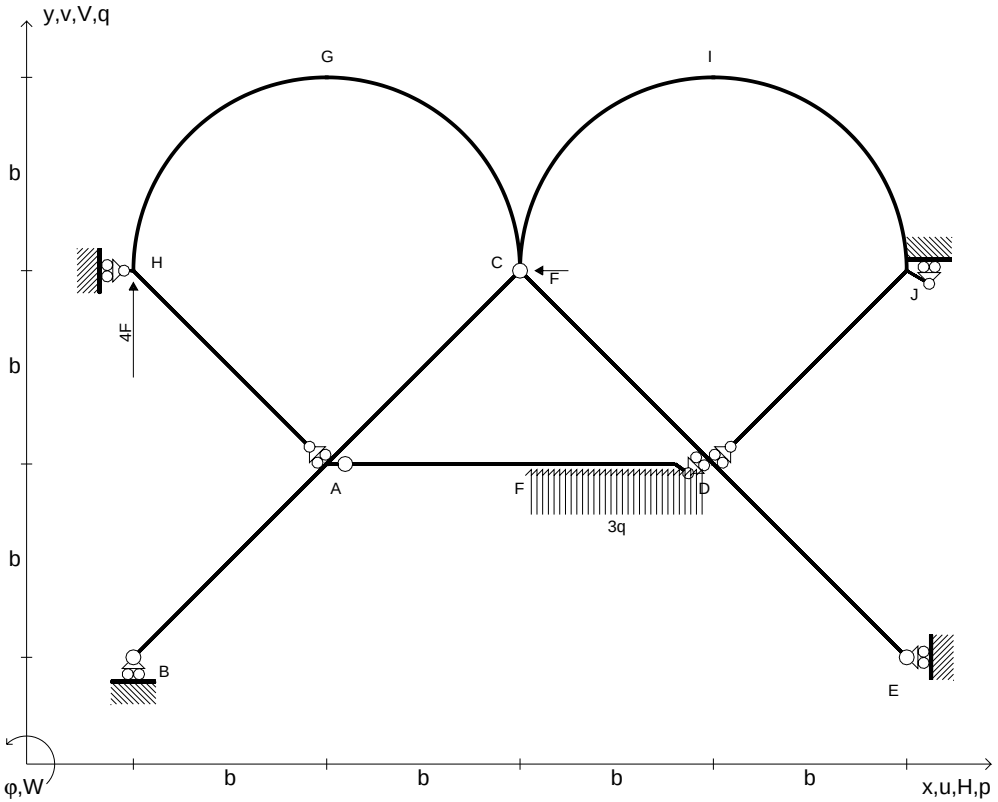


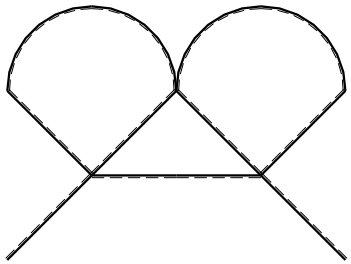
$H_C = -F$
$V_H = 4F$
$q_{FD} = 3q = 3F/b$

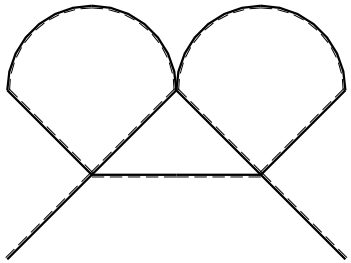
1 1 Piano AH

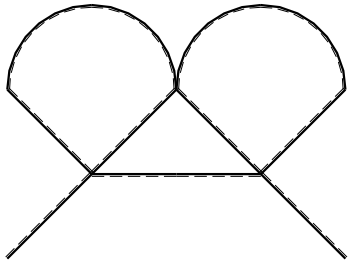
1 1 Piano DF

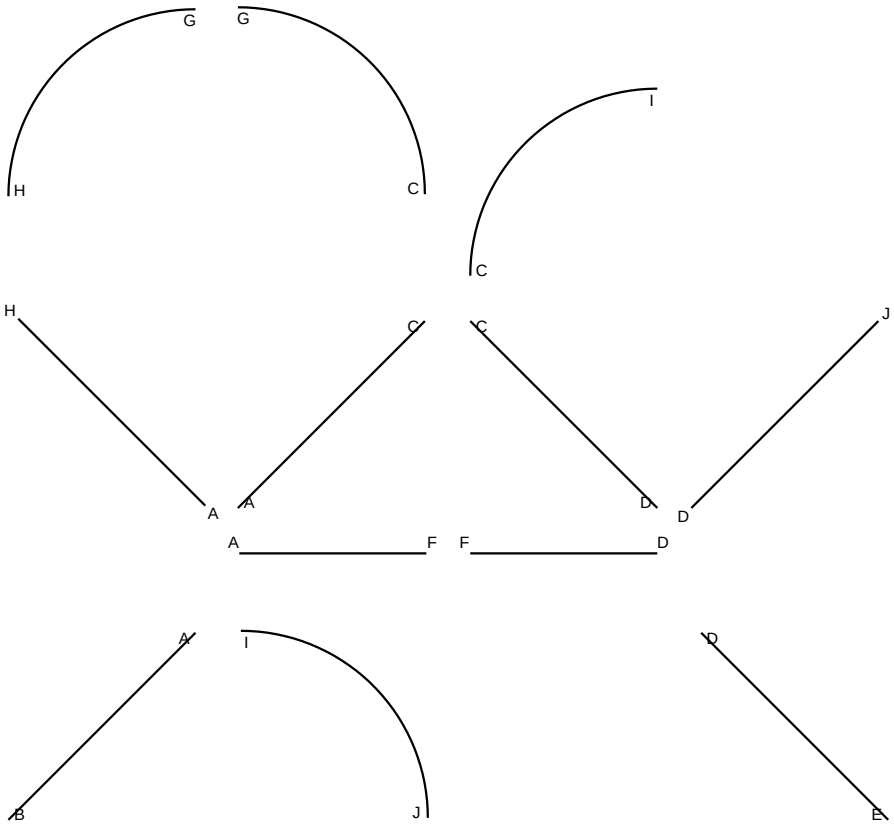
1 1 Piano DJ

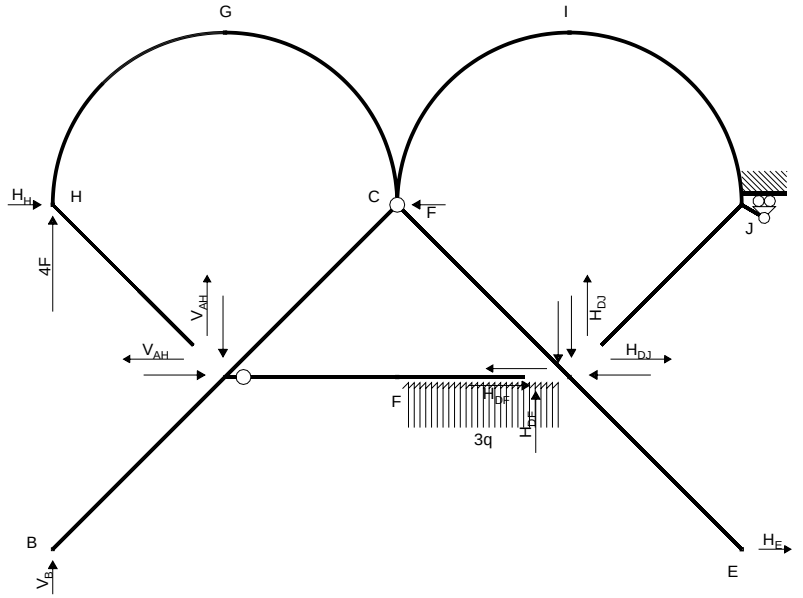
.
Svolgere l'analisi cinematica geometrica ed analitica.
Determinare matrice di congruenza e di equilibrio.
Determinare le reazioni vincolari a terra col PLV (Le=0).
Determinare le azioni interne in A (asta AC) col PLV (Le=0).
.
Carichi e deformazioni date hanno verso efficace in disegno.
Calcolare reazioni vincolari della struttura e delle aste.
Tracciare i diagrammi delle azioni interne nelle aste.
Piano di scorrimento del vincolo con inclinazione assegnata.











EQUAZIONI DI EQUILIBRIO

Traslazione orizzontale globale

$H_E + H_H = F$

Rotazione globale intorno a J

$-4V_B b + 2H_E b = 16Fb + 9/2qb^2$

Rotazione intorno a C: aste CA AB AF FD

$-2V_B b + 2H_{DF} b + 2V_{AH} b = -3/2qb^2$

Rotazione intorno a C: aste CD DE

$2H_E b - 2H_{DF} b - 2H_{DJ} b = 0$

Rotazione intorno a C: aste CG GH HA

$-2V_{AH} b = 8Fb$

Rotazione intorno a A: aste AF FD

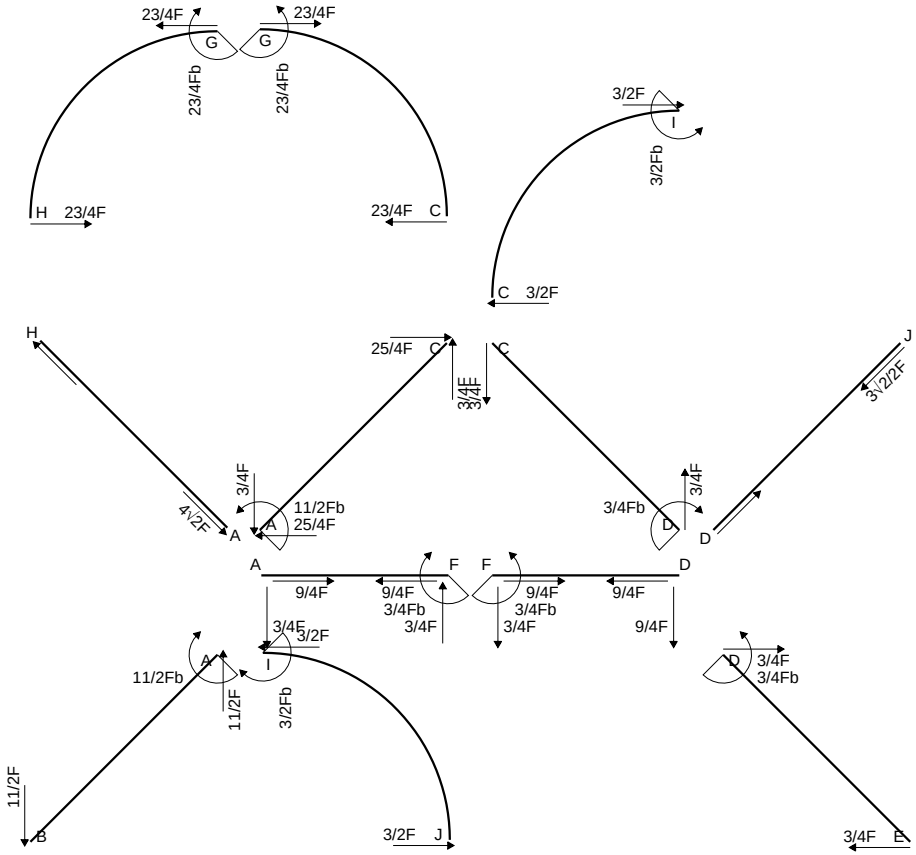
$2H_{DF} b = -9/2qb^2$

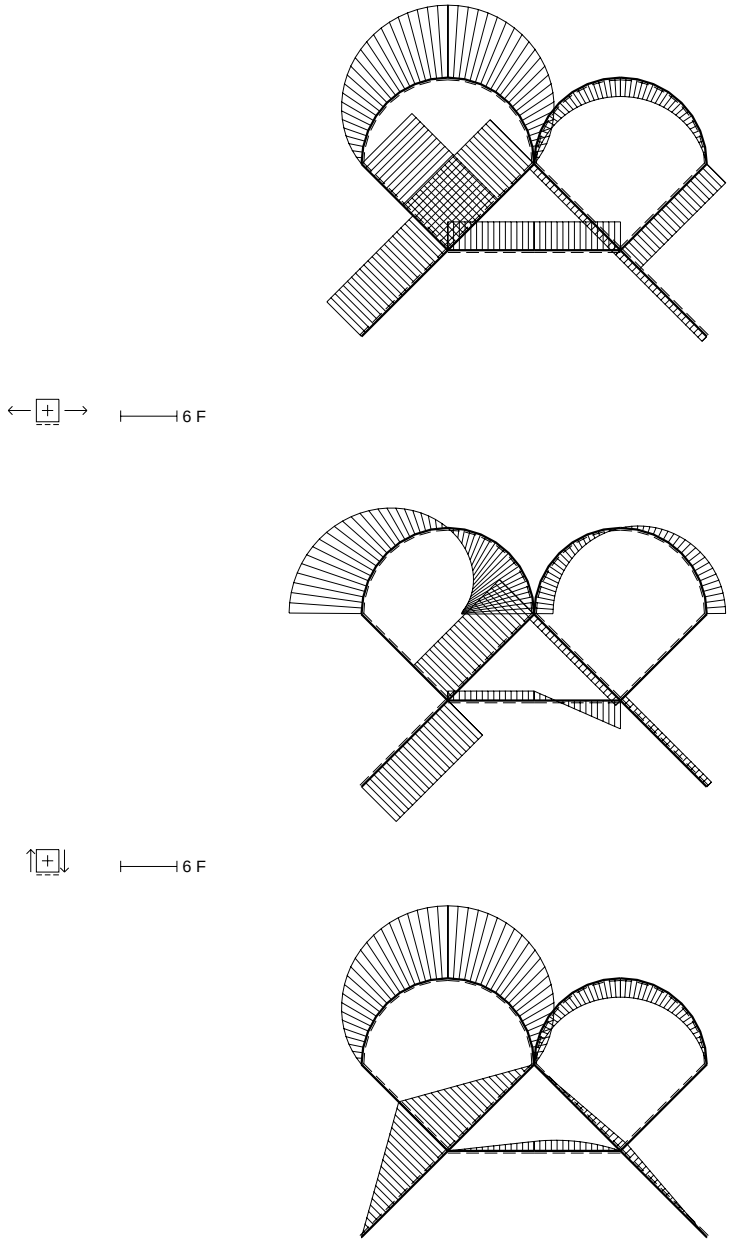
Matrice di equilibrio

	$V_B b$	$H_E b$	$H_H b$	$H_{DF} b$	$V_{AH} b$	$H_{DJ} b$		Fb	qb^2
u_J	0	1	1	0	0	0		1	0
φ_J	-4	2	0	0	0	0		16	9/2
φ_{CA}	-2	0	0	2	2	0	=	0	-3/2
φ_{CD}	0	2	0	-2	0	-2		0	0
φ_{CG}	0	0	0	0	-2	0		8	0
φ_{AF}	0	0	0	2	0	0		0	-9/2

Soluzione del sistema

		Fb	qb^2
$H_E b$		0	-3/4
$V_B b$		-4	-3/2
$H_H b$		1	3/4
$H_{DF} b$	=	0	-9/4
$V_{AH} b$		-4	0
$H_{DJ} b$		0	3/2


23/4F
G
23/4Fb
23/4F
G
23/4Fb
H 23/4F
23/4F C
3/2F
I
3/2Fb
C 3/2F
H
25/4F C
C
J
3/4F
3/4F
3√2/2F
4√2F
3/4F
A
11/2Fb
25/4F
A
3/4Fb
D
3/4F
D
A
F
F
D
9/4F
9/4F
3/4Fb
3/4F
9/4F
3/4Fb
3/4F
9/4F
3/4F
3/2F
I
A
11/2Fb
11/2F
3/2Fb
D
3/4F
3/4Fb
11/2F
B
3/2F J
3/4F E


6 F
6 F
6 Fb

Es.N.009

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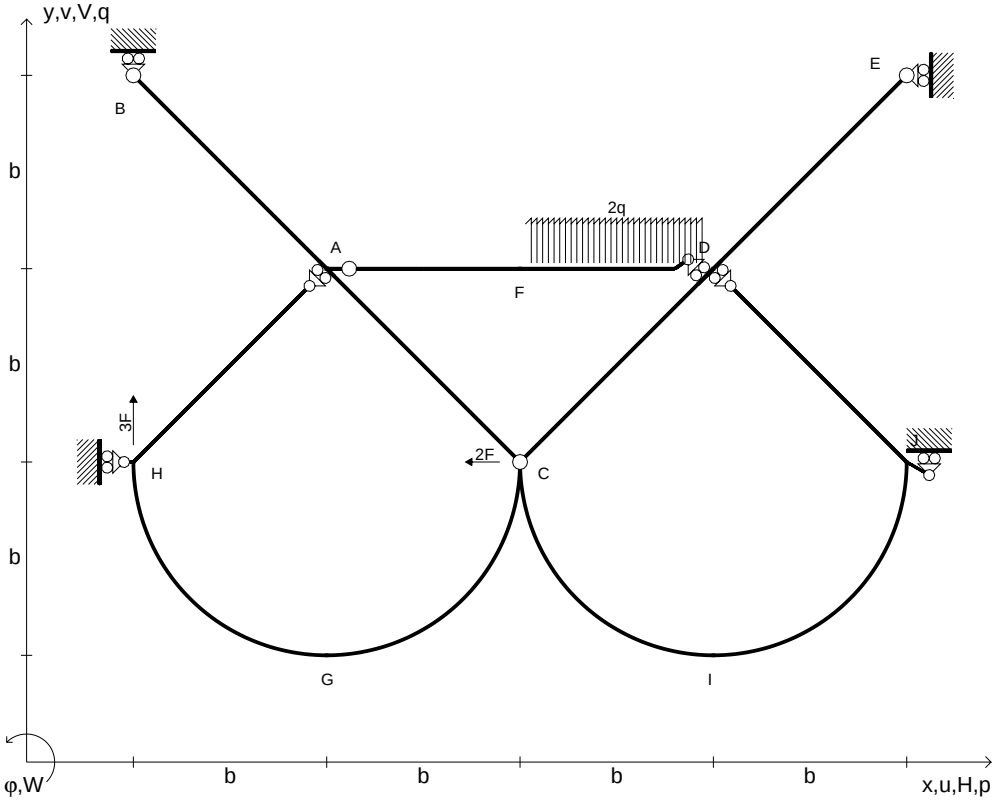

$H_C = -2F$
$V_H = 3F$
$q_{FD} = 2q = 2F/b$

1 1 Piano AH

1 1 Piano DF

1 1 Piano DJ

.
Svolgere l'analisi cinematica geometrica ed analitica.
Determinare matrice di congruenza e di equilibrio.
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.
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Calcolare reazioni vincolari della struttura e delle aste.
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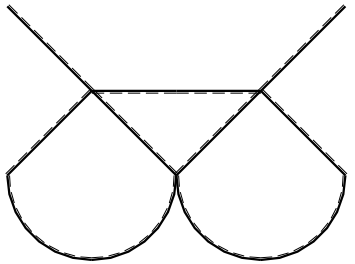
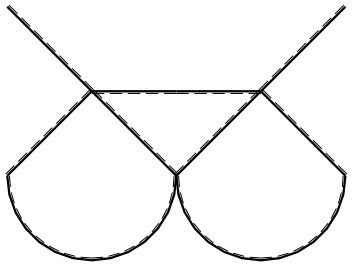
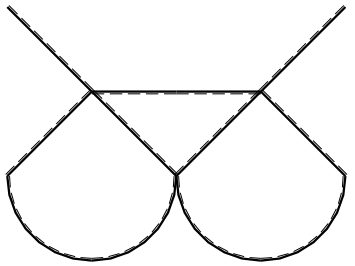
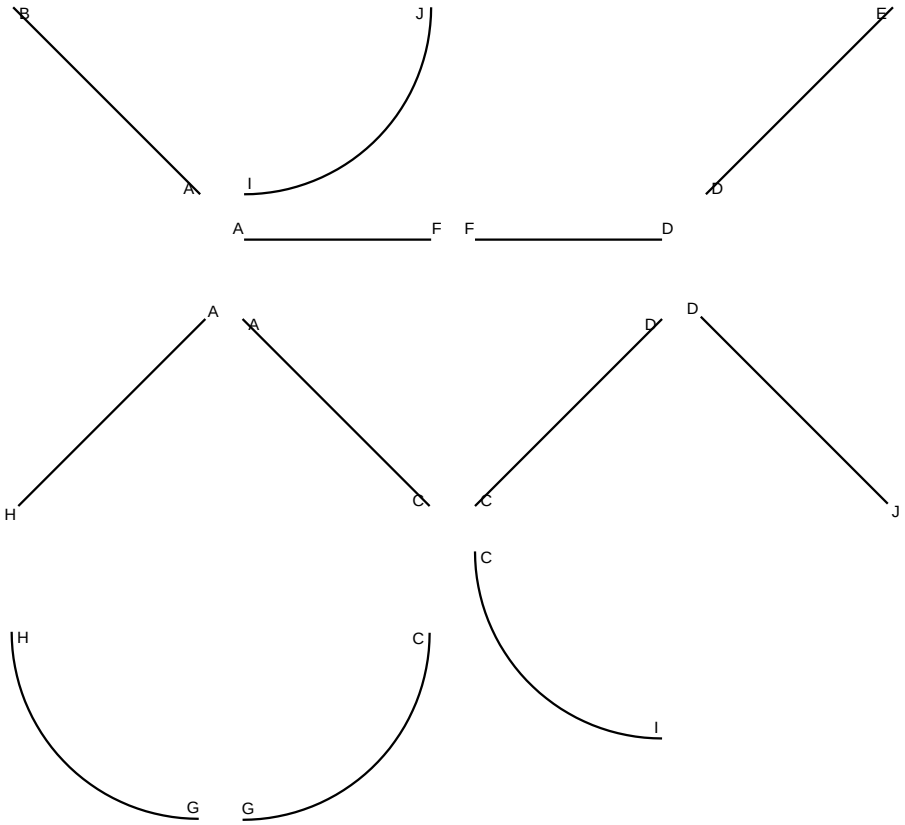
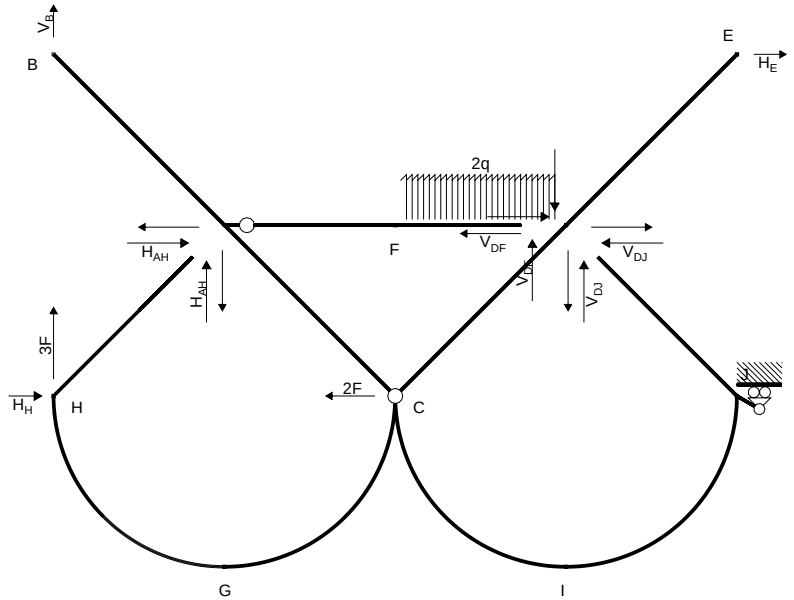
Piano di scorrimento del vincolo con inclinazione assegnata.











EQUAZIONI DI EQUILIBRIO

Traslazione orizzontale globale

$H_E + H_H = 2F$

Rotazione globale intorno a J

$-4V_B b - 2H_E b = 12Fb + 3qb^2$

Rotazione intorno a C: aste CA AB AF FD

$-2V_B b + 2V_{DF} b + 2H_{AH} b = -qb^2$

Rotazione intorno a C: aste CD DE

$-2H_E b - 2V_{DF} b - 2V_{DJ} b = 0$

Rotazione intorno a C: aste CG GH HA

$-2H_{AH} b = 6Fb$

Rotazione intorno a A: aste AF FD

$2V_{DF} b = -3qb^2$

Matrice di equilibrio

$$\begin{array}{c} \\ u_J \\ \varphi_J \\ \varphi_{CA} \\ \varphi_{CD} \\ \varphi_{CG} \\ \varphi_{AF} \end{array} \begin{bmatrix} V_B b & H_E b & H_H b & V_{DF} b & H_{AH} b & V_{DJ} b \\ 0 & 1 & 1 & 0 & 0 & 0 \\ -4 & -2 & 0 & 0 & 0 & 0 \\ -2 & 0 & 0 & 2 & 2 & 0 \\ 0 & -2 & 0 & -2 & 0 & -2 \\ 0 & 0 & 0 & 0 & -2 & 0 \\ 0 & 0 & 0 & 2 & 0 & 0 \end{bmatrix} = \begin{bmatrix} Fb & qb^2 \\ 2 & 0 \\ 12 & 3 \\ 0 & -1 \\ 0 & 0 \\ 6 & 0 \\ 0 & -3 \end{bmatrix}$$

Soluzione del sistema

$$\begin{bmatrix} H_E b \\ V_B b \\ H_H b \\ V_{DF} b \\ H_{AH} b \\ V_{DJ} b \end{bmatrix} = \begin{array}{c} \begin{bmatrix} Fb & qb^2 \end{bmatrix} \\ \begin{bmatrix} 0 & 1/2 \\ -3 & -1 \\ 2 & -1/2 \\ 0 & -3/2 \\ -3 & 0 \\ 0 & 1 \end{bmatrix} \end{array}$$

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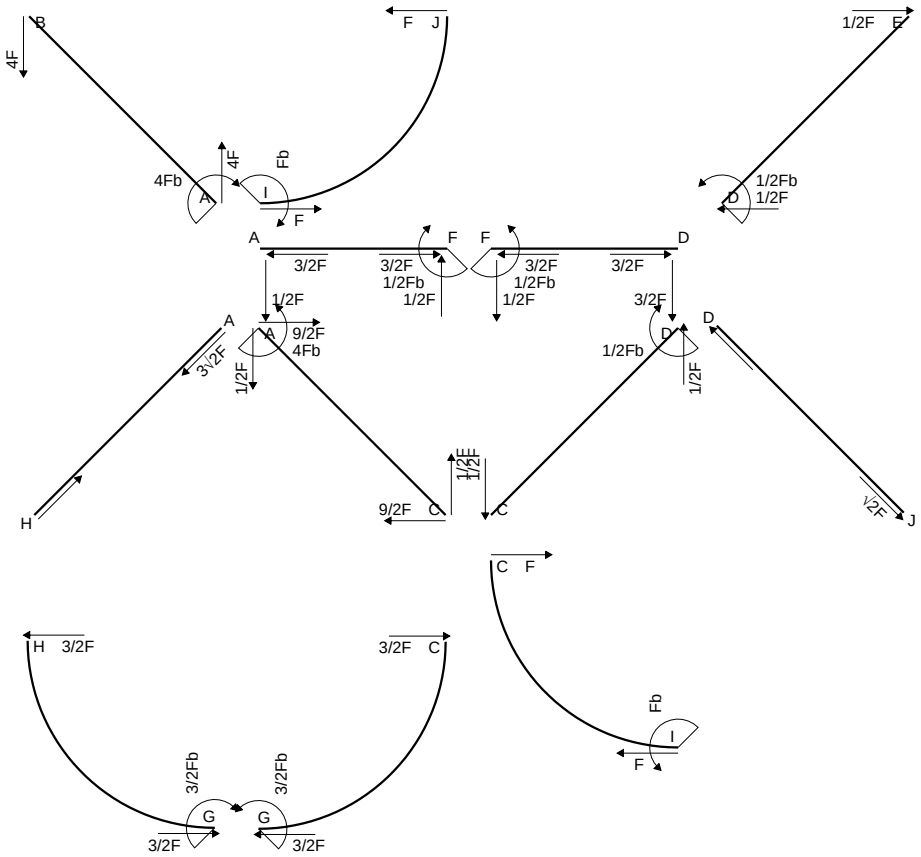

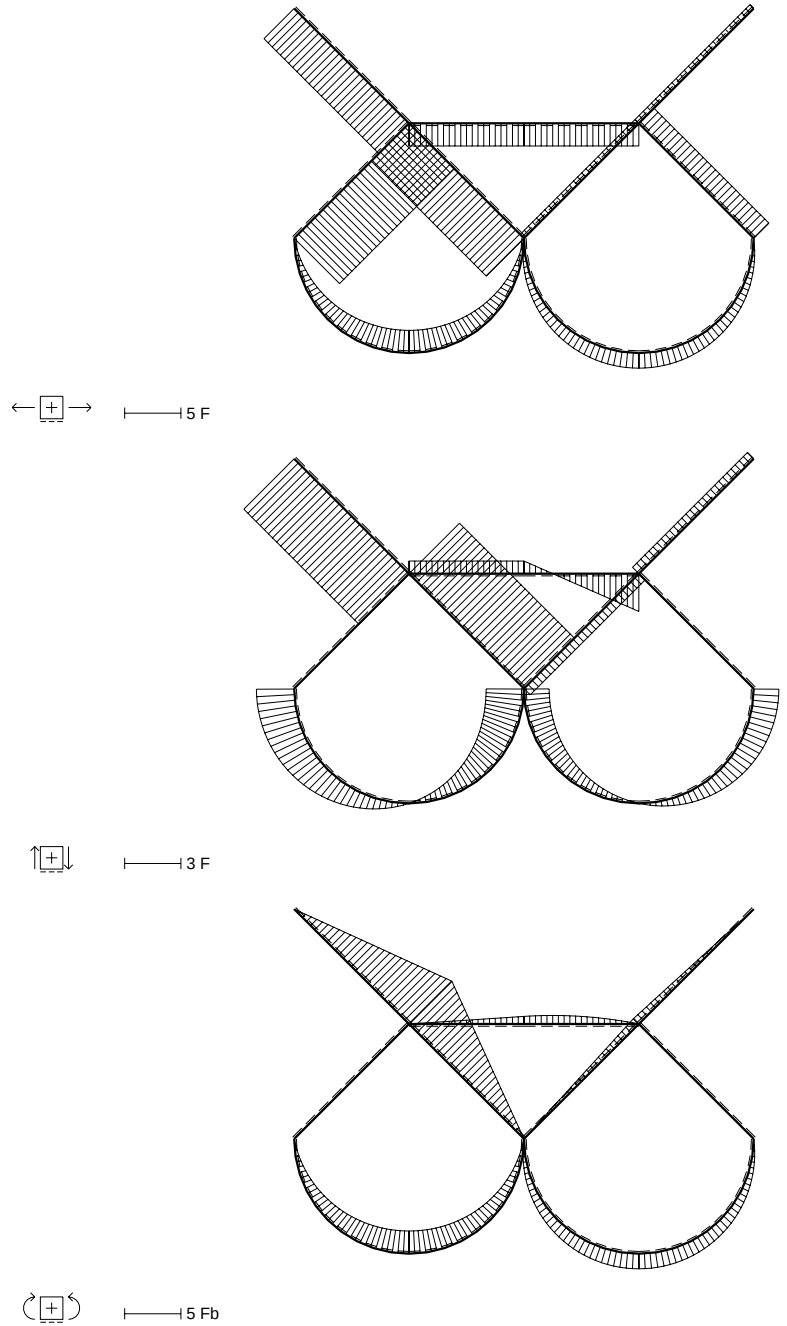

Es.N.010

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