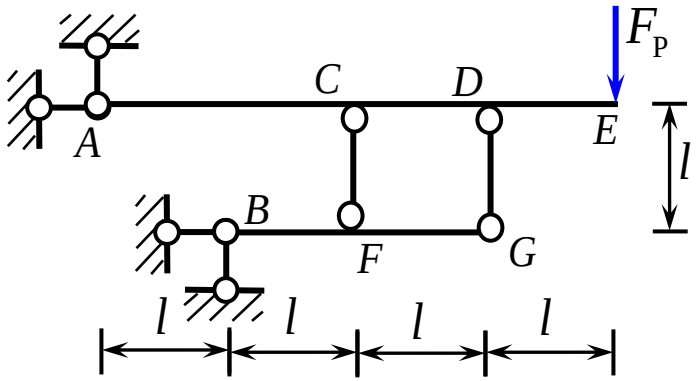
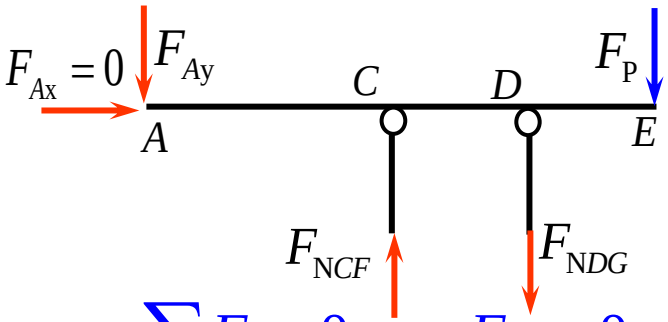
【例题1】作弯矩图。（三刚片）

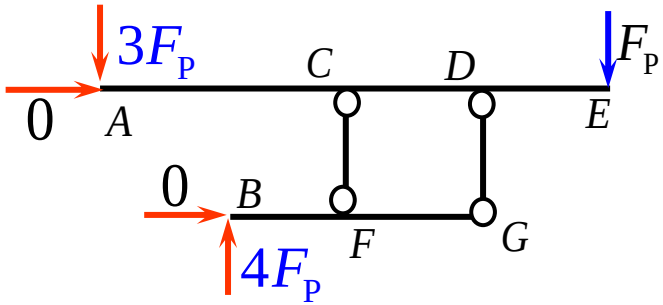


第1个隔离体：



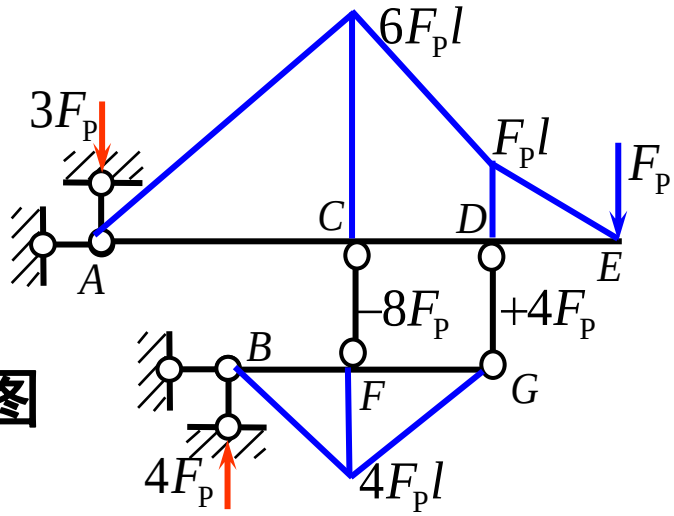
$$\sum F_x = 0 \quad \Rightarrow F_{Ax} = 0$$

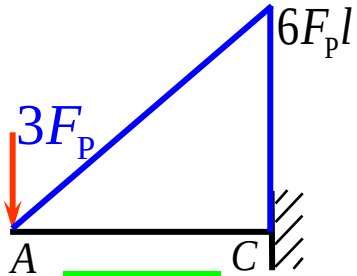
第2个隔离体：



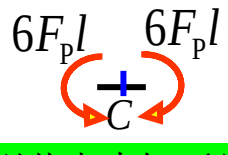
$$\sum M_B = 0 \quad \Rightarrow F_{Ay} = 3F_P$$

弯矩图

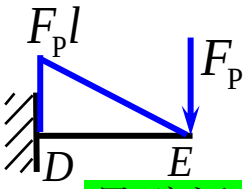




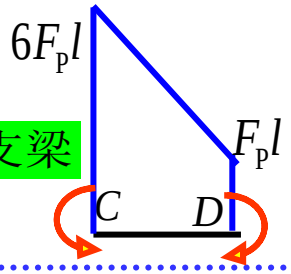
悬臂梁



刚节点力矩平衡

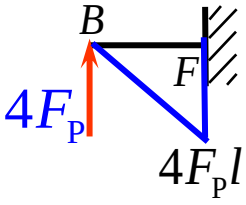


悬臂梁



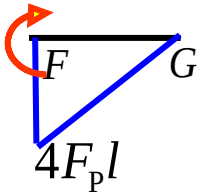
简支梁

刚节点力矩平衡



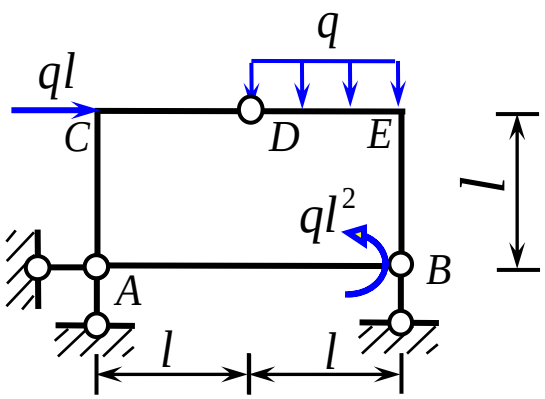
悬臂梁

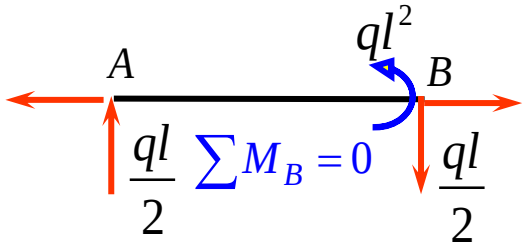
刚节点力矩平衡

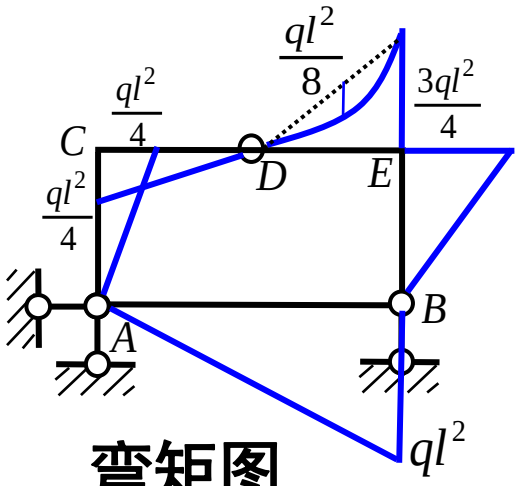


简支梁

【例题2】弯矩图。（三刚片基附）

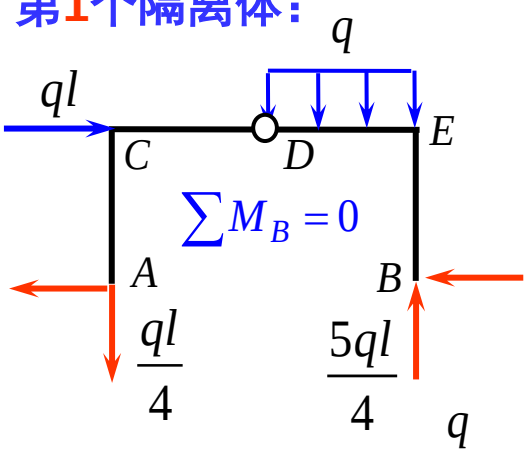




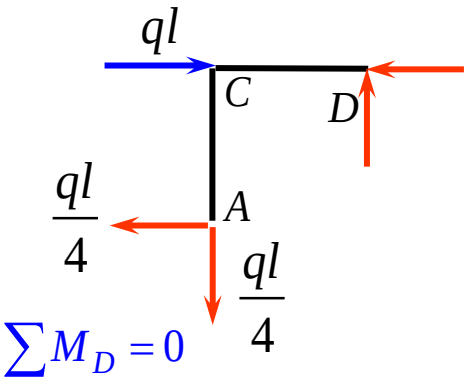


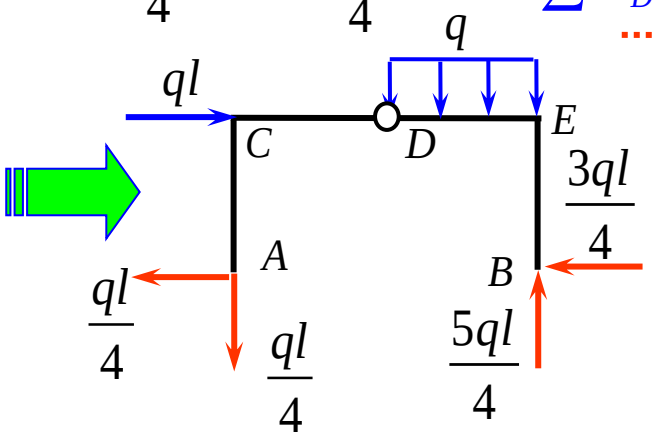
弯矩图

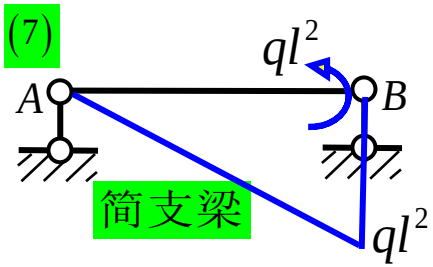
第1个隔离体：

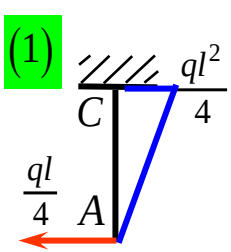


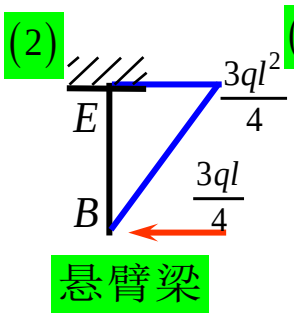
第2个隔离体：

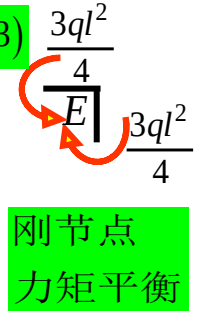


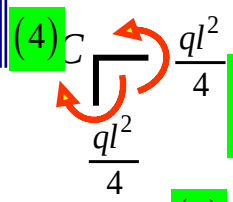


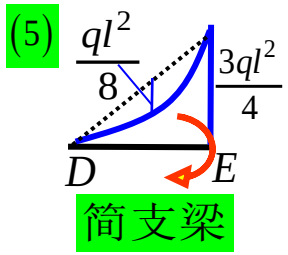


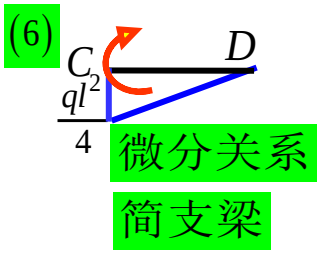






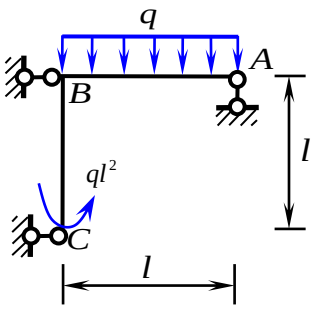


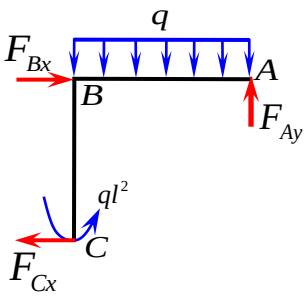




弯矩图快速做法：悬臂梁、简支梁、刚结点平衡、微分关系。

【例题3】弯矩图。（两刚片）

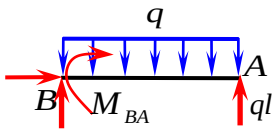




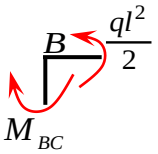
$\sum F_y = 0$ $F_{Ay} = ql$

$\sum M_A = 0$ $F_{Cx} = \frac{3ql}{2}$

$\sum F_x = 0$ $F_{Ax} = \frac{3ql}{2}$

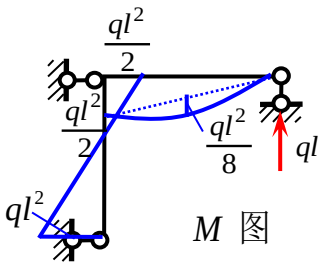


$\sum M_B = 0$ $M_{BA} = \frac{ql^2}{2}$



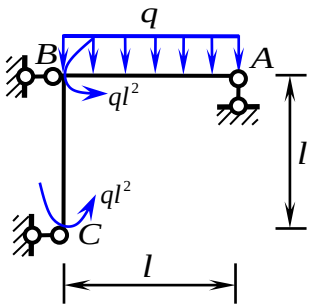
$\sum M_B = 0$

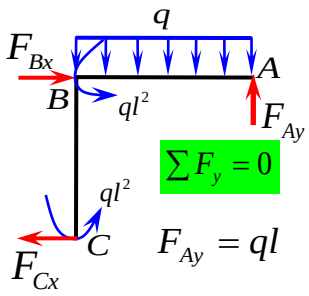
$M_{BC} = \frac{ql^2}{2}$



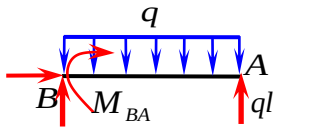
M 图

【例题4】弯矩图。（两刚片）

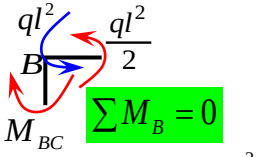




$\sum F_y = 0$ $F_{Ay} = ql$

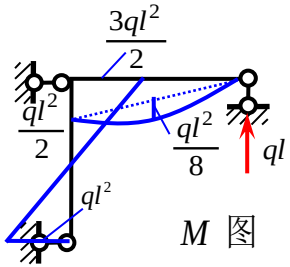


$\sum M_B = 0$ $M_{BA} = \frac{ql^2}{2}$



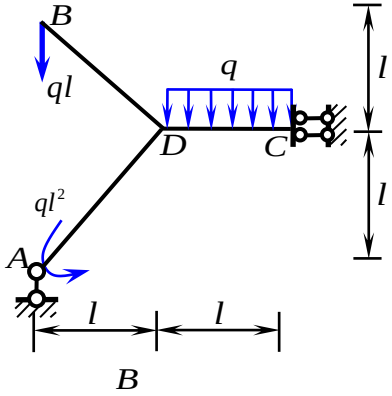
$\sum M_B = 0$

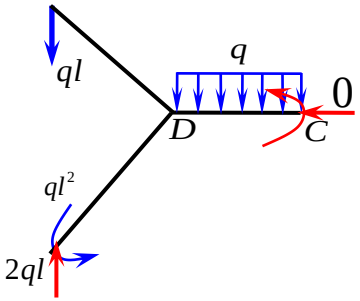
$M_{BC} = \frac{3ql^2}{2}$

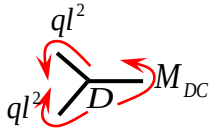


M 图

【例题5】弯矩图。（两刚片）

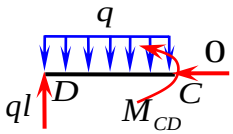






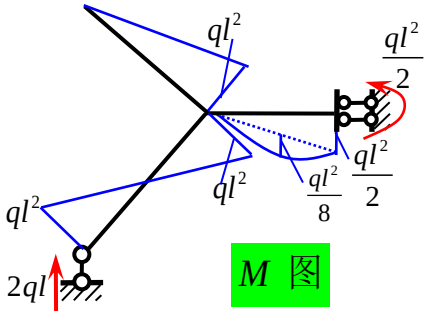
$\sum M_D = 0$

$M_{DC} = 0$



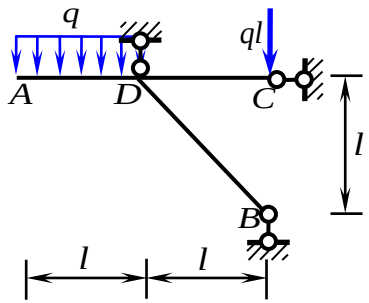
$\sum M_D = 0$

$M_{CD} = ql^2/2$



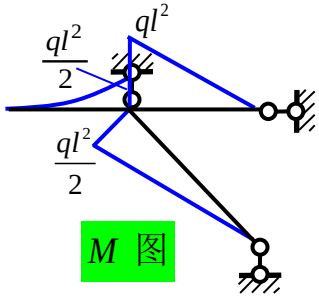
M 图

【例题6】弯矩图。（两刚片1-4）



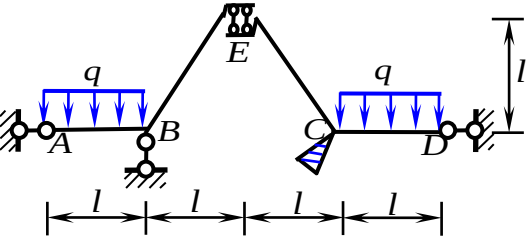
$\sum M_D = 0$

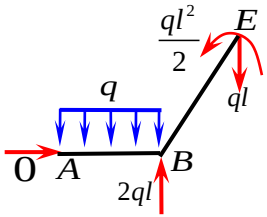
$M_{DB} = ql^2/2$



M 图

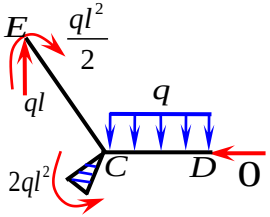
【例题7】弯矩图。（简单刚架5-18）





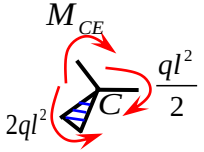
$\sum M_B = 0$

$M_{EB} = ql^2/2$



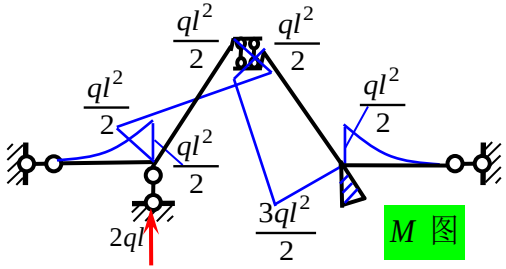
$\sum M_E = 0$

$M_C = 2ql^2$



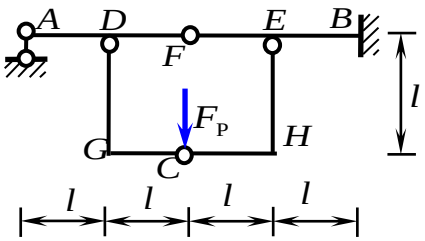
$\sum M_C = 0$

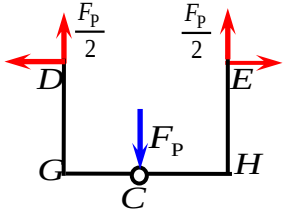
$M_{CE} = 3ql^2/2$



M 图

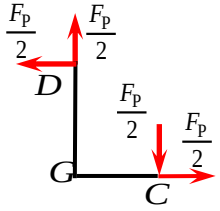
【例题8】弯矩图。（基附型3-3）





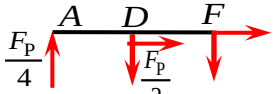
$\sum M_E = 0$ $F_{Dy} = F_P/2$

$\sum F_y = 0$ $F_{Ey} = F_P/2$



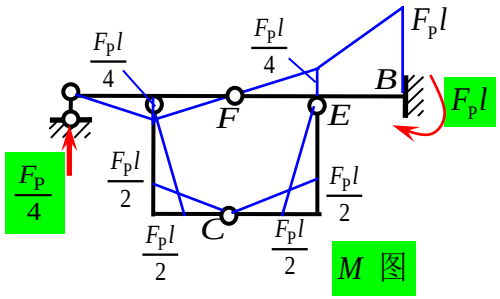
$\sum M_C = 0$

$F_{Dx} = F_P/2$



$\sum M_F = 0$

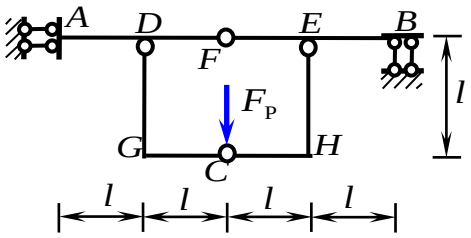
$F_{Ay} = F_P/4$

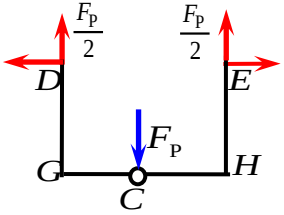


M 图

$\sum M_B = 0$ $M_B = F_P l$

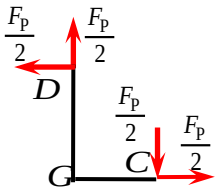
【例题9】弯矩图。（基附型3-8）





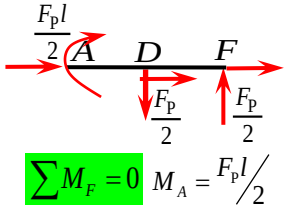
$\sum M_E = 0$ $F_{Dy} = F_P/2$

$\sum F_y = 0$ $F_{Ey} = F_P/2$

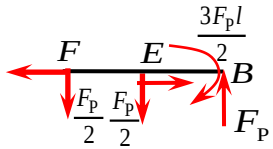


$\sum M_C = 0$

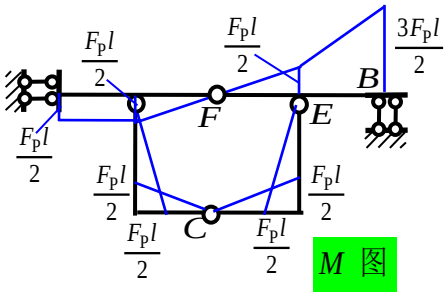
$F_{Dx} = F_P/2$



$\sum M_F = 0$ $M_A = F_P l/2$

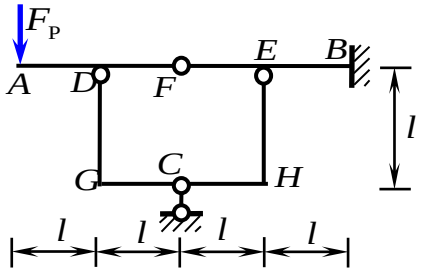


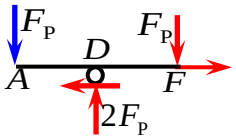
$\sum M_B = 0$ $M_B = 3F_P l/2$



M 图

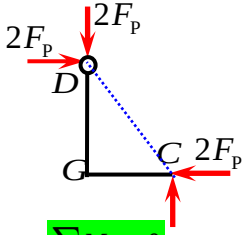
【例题10】弯矩图。（基附型3-1）





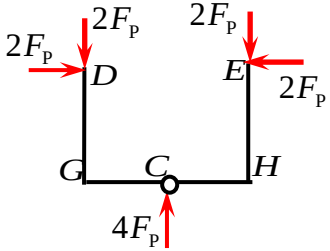
$\sum M_D = 0$

$F_{Fy} = F_P$



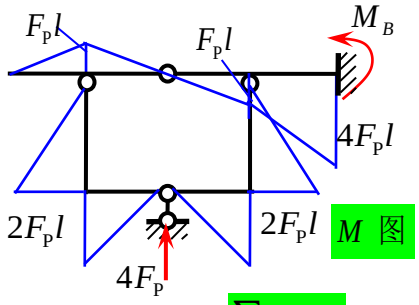
$\sum M_C = 0$

$F_{Dx} = 2F_P$



$\sum F_x = 0$ $F_{Ex} = 2F_P$

$\sum M_E = 0$ $F_{Cy} = 4F_P$

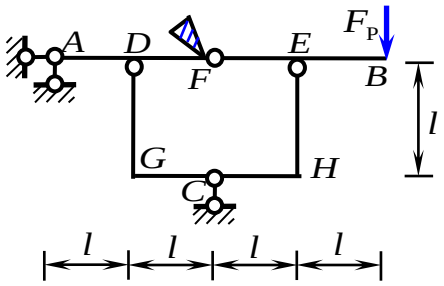


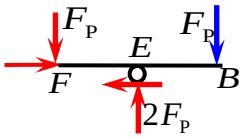
M 图

$\sum M_B = 0$

$M_B = 4F_P l$

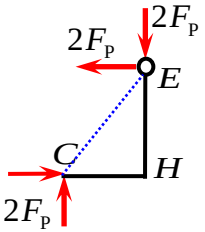
【例题11】弯矩图。（两刚片基附3-16）





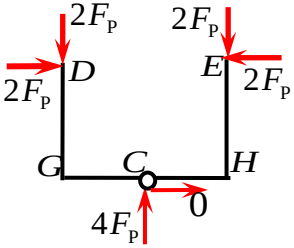
$\sum M_E = 0$ $F_{Fy} = F_P$

$\sum F_y = 0$ $F_{Ey} = 2F_P$



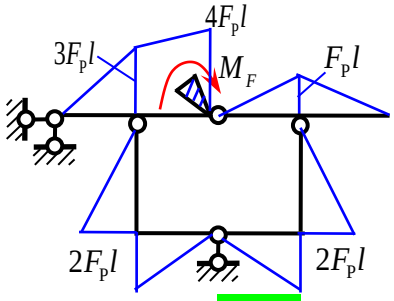
$\sum M_C = 0$

$F_{Ex} = 2F_P$



$\sum F_x = 0$ $F_{Dx} = 2F_P$

$\sum M_D = 0$ $F_{Cy} = 4F_P$

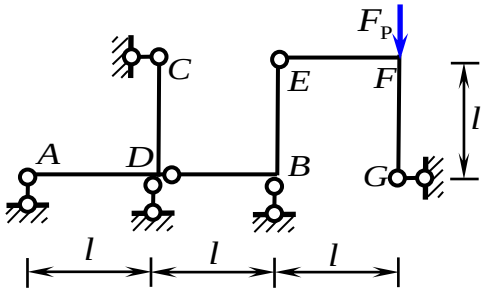


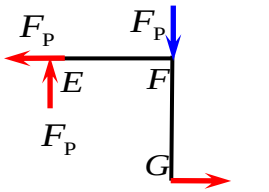
M 图

$\sum M_A = 0$

$M_F = 4F_P l$

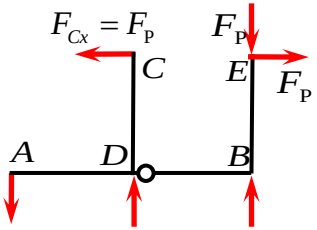
【例题12】弯矩图。（两刚片基附3-17）



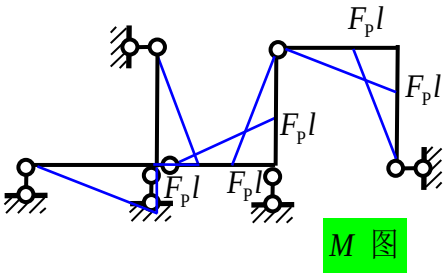


$\sum M_E = 0$ $F_{Gx} = F_P$

$F_{Gx} = F_P$

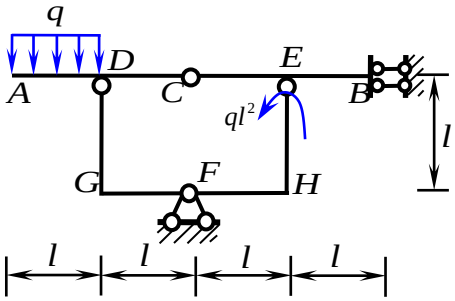


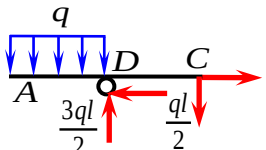
$\sum F_x = 0$ $F_{Cx} = F_P$



M 图

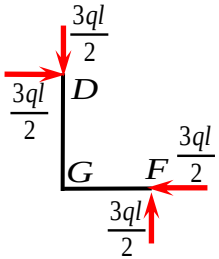
【例题13】弯矩图。（两刚片基附3-22）





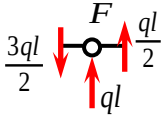
$\sum M_C = 0$ $F_{Dy} = 3ql/2$

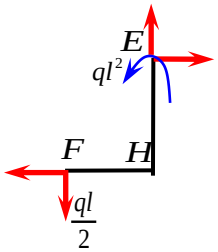
$\sum F_y = 0$ $F_{Cy} = ql/2$

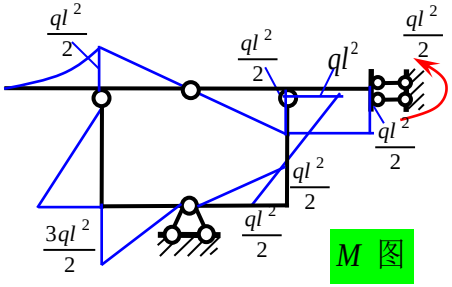


$\sum M_F = 0$

$F_{Dx} = 3ql/2$

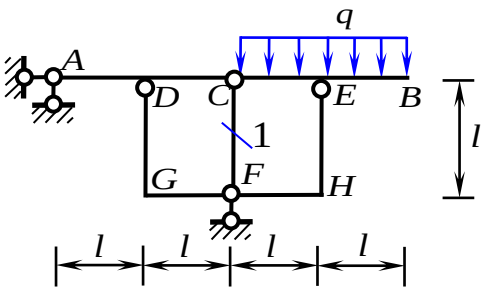


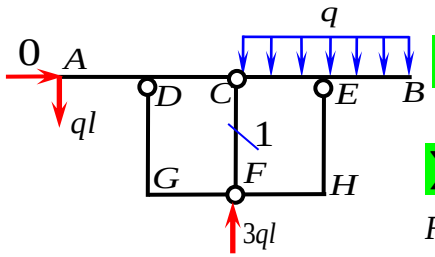




M 图

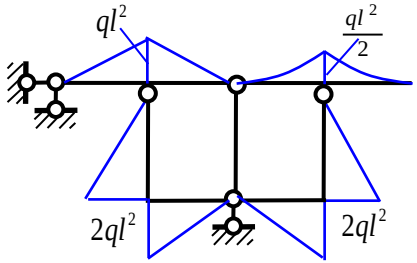
【例题14】弯矩图。（两刚片基附3-25）



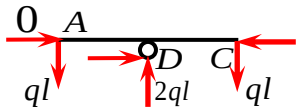


$\sum M_C = 0$ $F_{Ay} = ql$

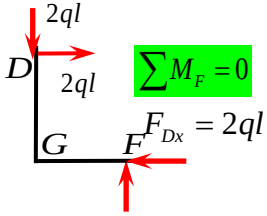
$\sum F_y = 0$ $F_{Fy} = 3ql$



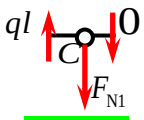
M 图



$\sum M_C = 0$ $F_{Dy} = 2ql$



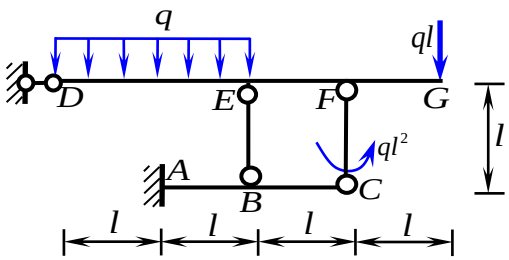
$\sum M_F = 0$ $F_{Dx} = 2ql$

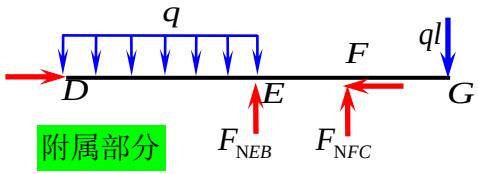


$\sum F_y = 0$

$F_{N1} = +ql$(拉力)

【例题15】弯矩图。（基附型3-37）

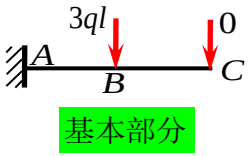




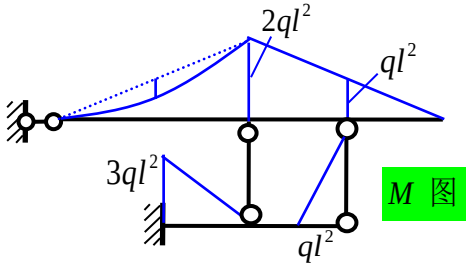
附属部分

$\sum M_F = 0$　$F_{NEB} = 3ql$(压力)

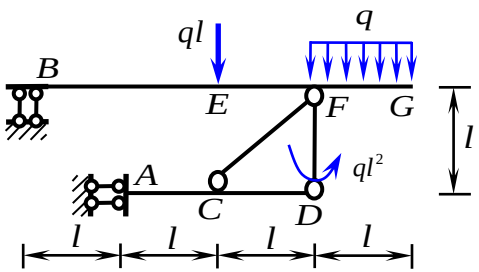
$\sum F_y = 0$　$F_{NFC} = 0$

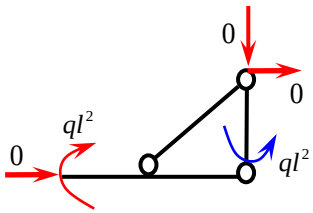


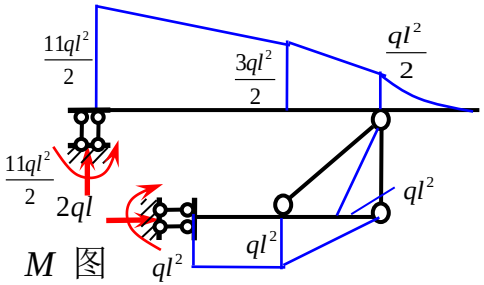
基本部分

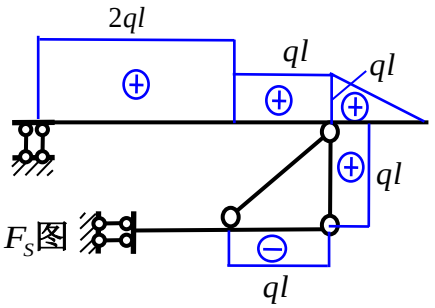


【例题16】弯矩图。（三刚片）

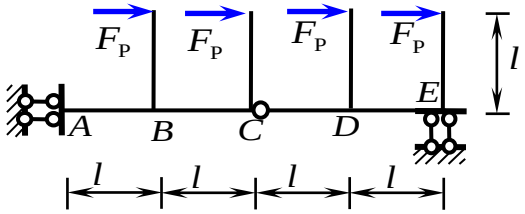


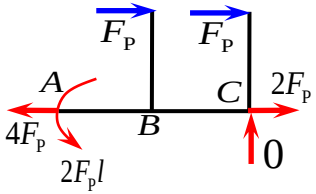


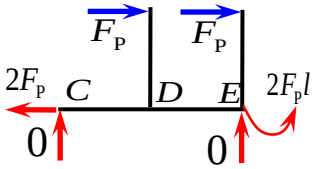


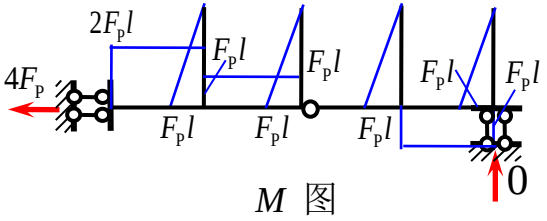


【例题17】弯矩图。（基附型3-35）

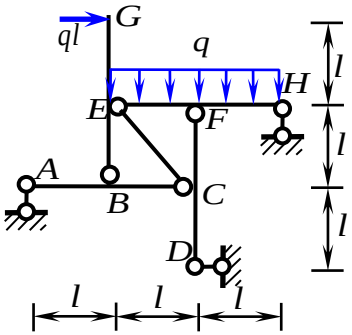


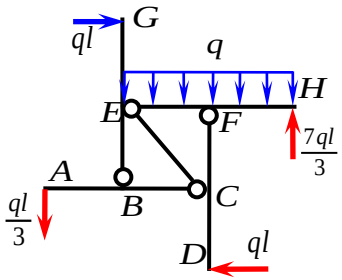






【例题18】弯矩图。（基附型3-29）



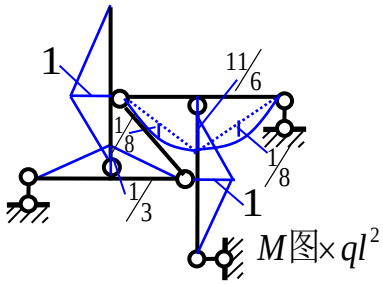


$\sum M_A = 0$

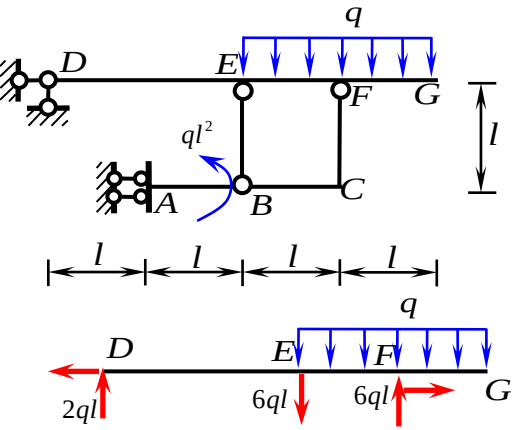
$F_{Ay} = 7ql/3$

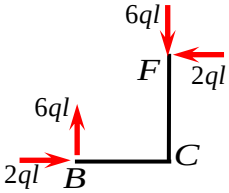
$\sum F_y = 0$

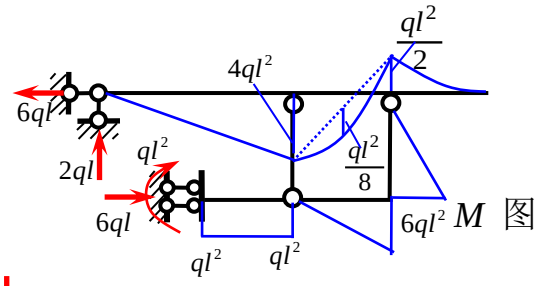
$F_{Ay} = ql/3$

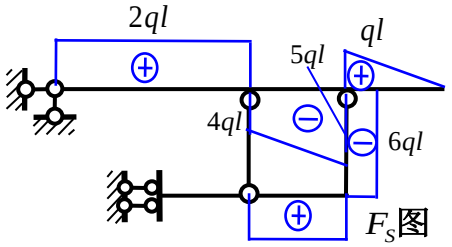


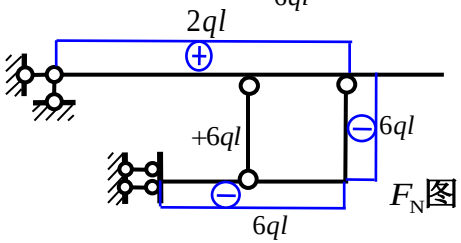
【例题19】内力图。（三刚片4-18）



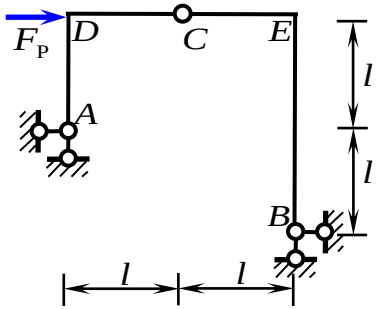


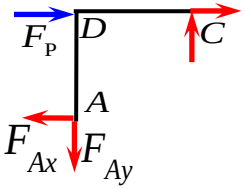






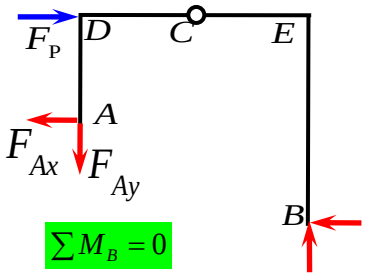
【例题20】弯矩图。（三刚片4-21）





$\sum M_C = 0$

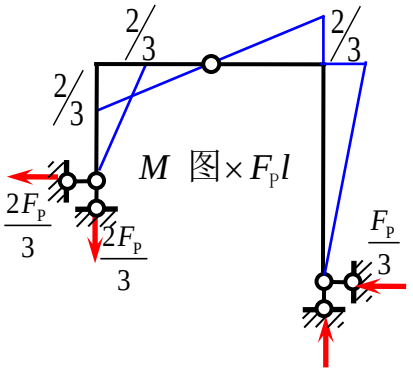
$F_{Ax}l - F_{Ay}l = 0$



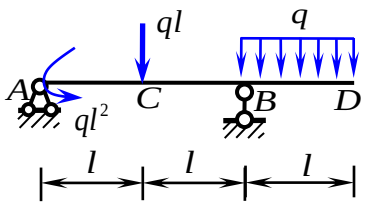
$\sum M_B = 0$

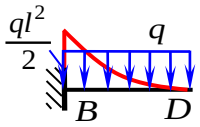
$F_{Ax}l + F_{Ay} \times 2l - F_P \times 2l = 0$

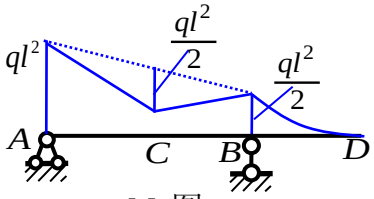
$F_{Ax} = 2F_P/3$ $F_{Ay} = 2F_P/3$



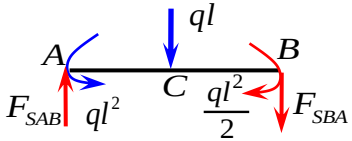
【例题21】内力图。（多跨梁1-1）





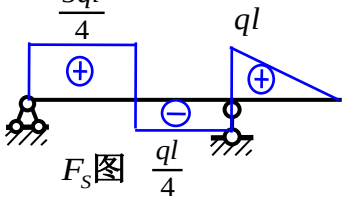


M 图



$\sum M_B = 0 \quad F_{SAB} = 3ql/4$

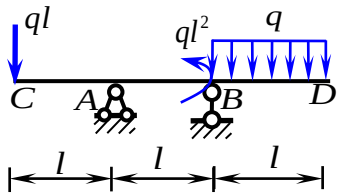
$\sum F_y = 0 \quad F_{SBA} = -ql/4$

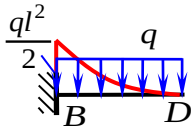


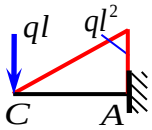
F_S图

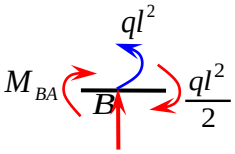
BD杆件用悬臂梁法作弯矩图，**A**截面弯矩等于外力偶，
AB杆件用简支梁法叠加得到弯矩图。

【例题22】内力图。（多跨梁1-2）



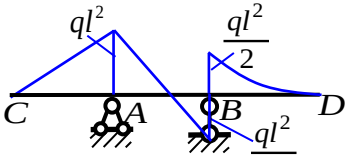




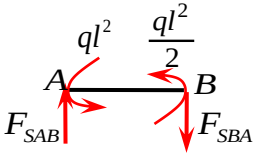


$\sum M_B = 0$

$M_{BA} = ql^2/2$

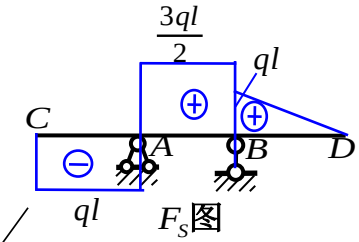


M 图



$\sum M_B = 0 \quad F_{SAB} = 3ql/2$

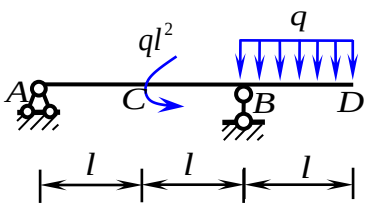
$\sum F_y = 0 \quad F_{SBA} = 3ql/2$

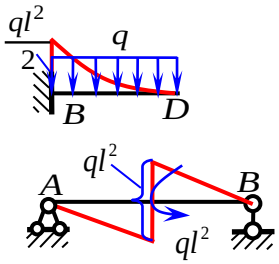


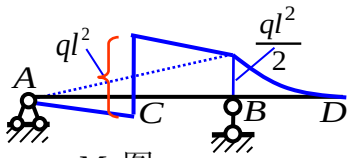
F_S图

CA杆件用悬臂梁法作弯矩图，**BD**杆件用悬臂梁法作弯矩图，
B截面弯矩突变值等于外力偶，
AB杆件由微分关系得到弯矩图（或者用简支梁法不需要叠加）。

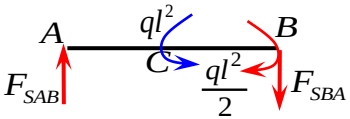
【例题23】内力图。（多跨梁1-3）



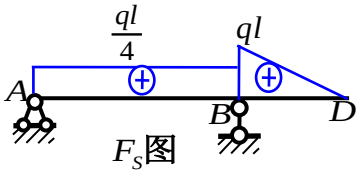




M 图



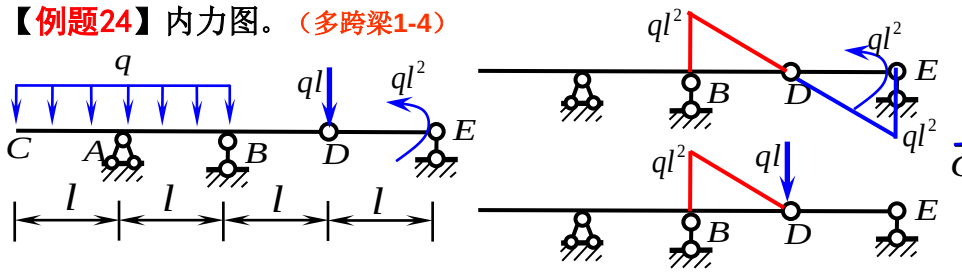
$\sum M_B = 0 \quad F_{SAB} = ql/4$

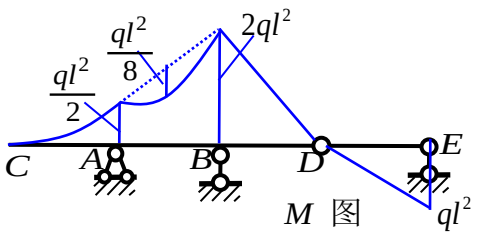


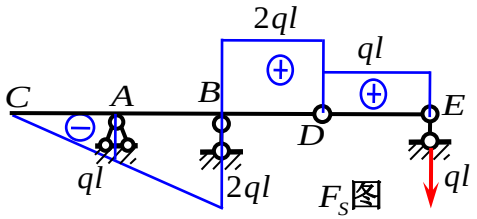
F_S图

BD杆件用悬臂梁法作弯矩图； **AB**杆件用简支梁法叠加得到弯矩图，
C截面弯矩突变值等于外力偶值，**AB**杆各处剪力相同。

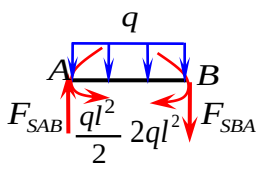
【例题24】内力图。（多跨梁1-4）





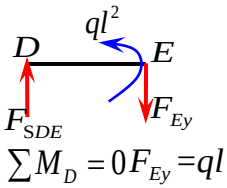


该体系为基附型结构，DE为附属部分，CABD为基本部分，先附后基顺序计算。
CA杆件用悬臂梁法作弯矩图；E截面弯矩等于外力偶，
DE段杆件用简支梁法(或微分关系)得到弯矩图；
BD段弯矩图由叠加得到。 AB段用简支梁法叠加得到弯矩图。



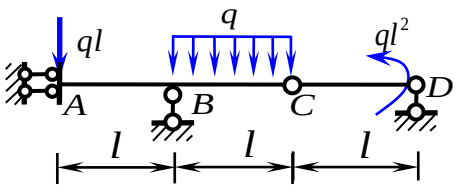
$\sum M_B = 0 \quad F_{SAB} = -ql$

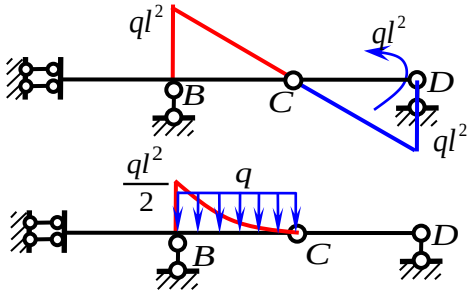
$\sum F_y = 0 \quad F_{SBA} = -2ql$

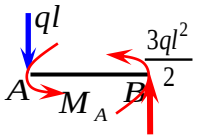


$\sum M_D = 0 \quad F_{Ey} = ql$

【例题25】弯矩图。（多跨梁1-6）

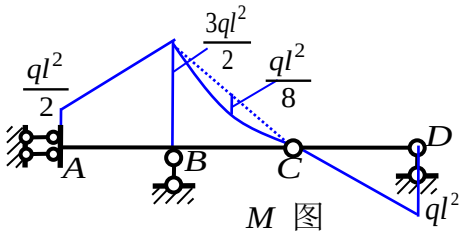






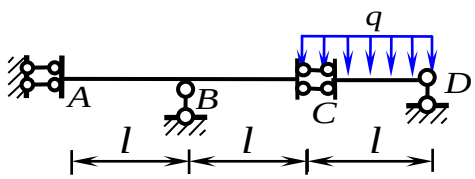
$\sum M_B = 0$

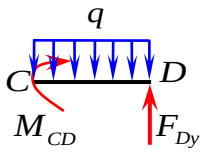
$M_A = \frac{ql^2}{2}$



该体系为基附型结构，CD为附属部分，ABC为基本部分，按照先附后基顺序计算。
CD段杆件用简支梁法(或微分关系)得到弯矩图；BC段B截面弯矩由叠加得到，
BC段用简支梁法叠加得到弯矩图； AB段A截面弯矩由力矩平衡条件求出，AB段由微分关系得到弯矩图。

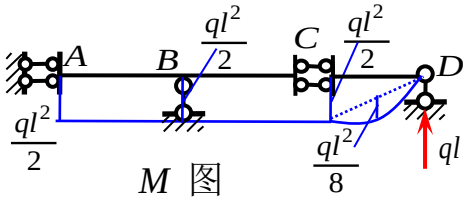
【例题26】内力图。（多跨梁1-7）





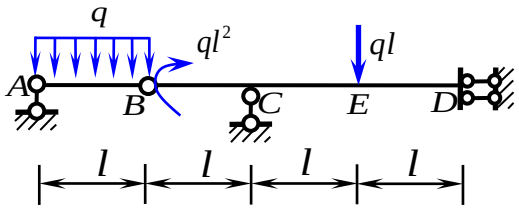
$\sum M_D = 0$

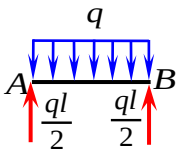
$M_{CD} = ql^2/2$

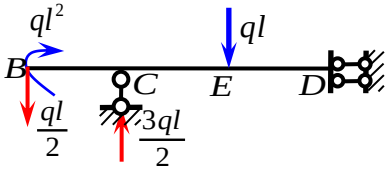


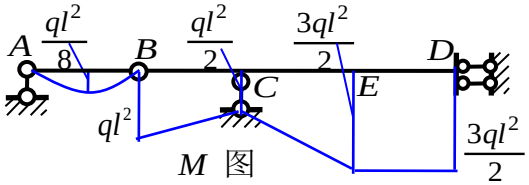
该体系为基附型结构，CD为附属部分，ABC为基本部分，按照先附后基顺序计算。
CD段杆件用简支梁法得到弯矩图；C定向节点左右弯矩相等，BC段剪力为零弯矩图为常数；
B支座左右截面弯矩相等，AB段剪力为零弯矩图为常数。

【例题27】弯矩图。（多跨梁1-8）



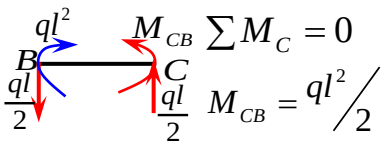


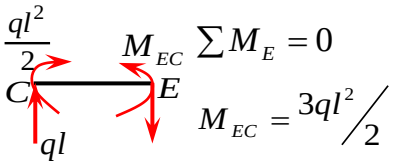




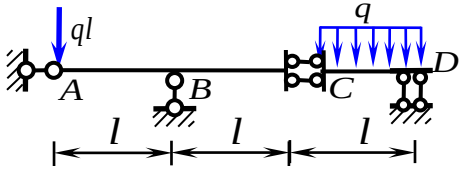
基附型结构，**AB**为附属部分，**BCED**为基本部分，按照先附后基顺序。

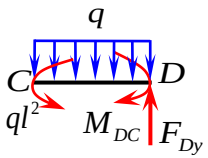
AB段杆件用简支梁法得到弯矩图；**BC**段、**CE**段杆件由微分关系作弯矩图；**ED**段剪力为零弯矩图为常数。





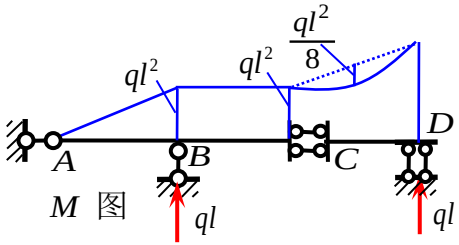
【例题28】弯矩图。（多跨梁1-10）





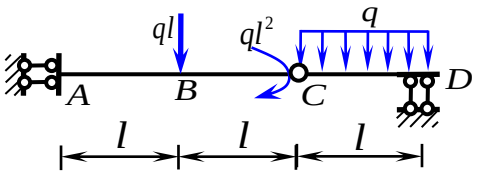
$$\sum M_D = 0$$

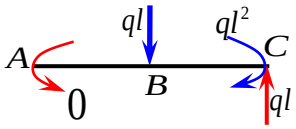
$$M_{DC} = 3ql^2/2$$



三刚片结构。**AB**段杆件用悬臂梁法作弯矩图；**BC**段剪力为零弯矩图为常数；**CD**段杆件用简支梁法得到弯矩图。

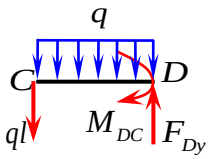
【例题29】弯矩图。（多跨梁1-13）





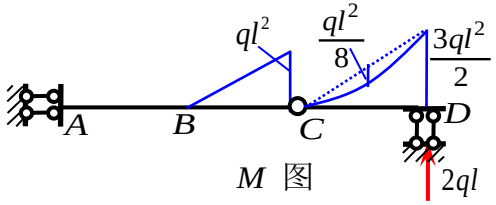
$$\sum M_B = 0$$

$$M_A = 0$$



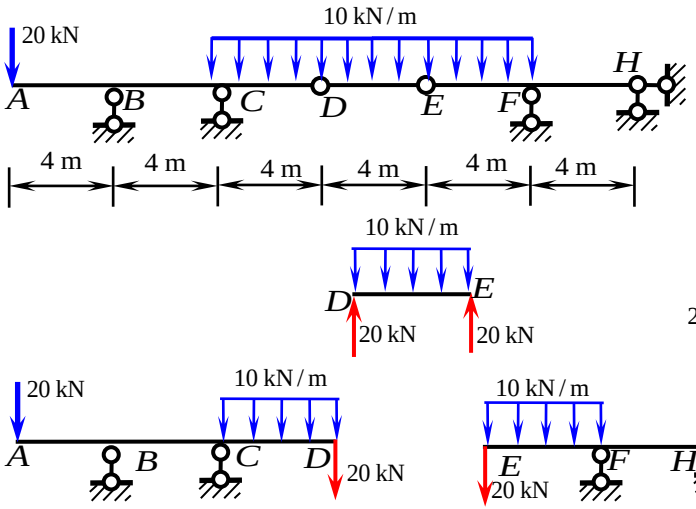
$$\sum M_D = 0$$

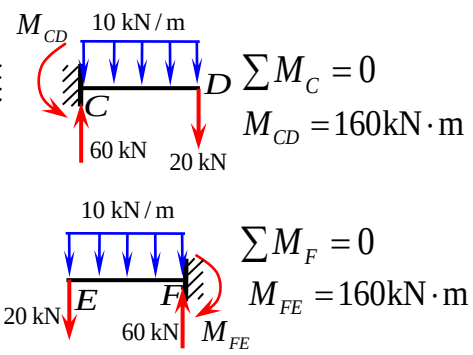
$$M_{DC} = 3ql^2/2$$

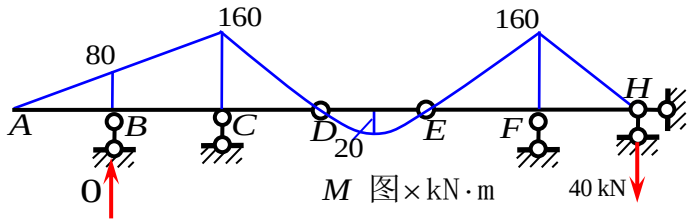


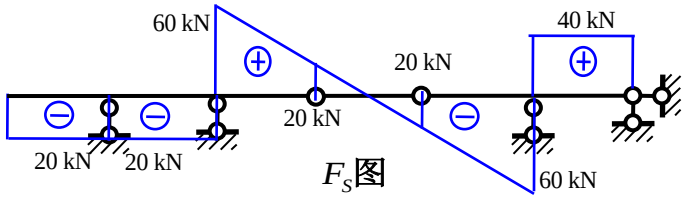
三刚片结构。**AB**段杆件弯矩为零；**BC**段弯矩图为直线；**CD**段杆件用简支梁法得到弯矩图。

【例题30】内力图。（多跨梁1-18）



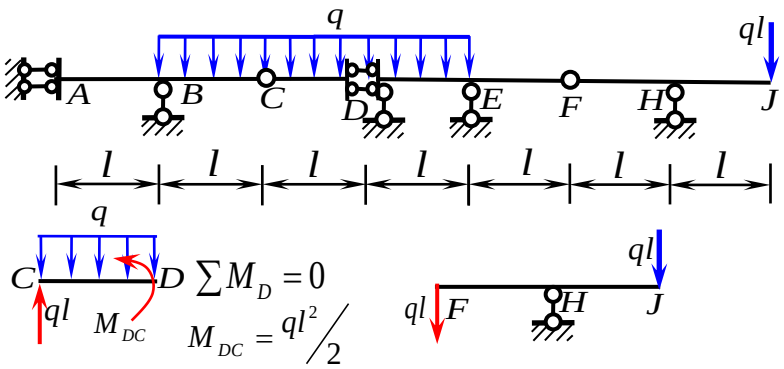


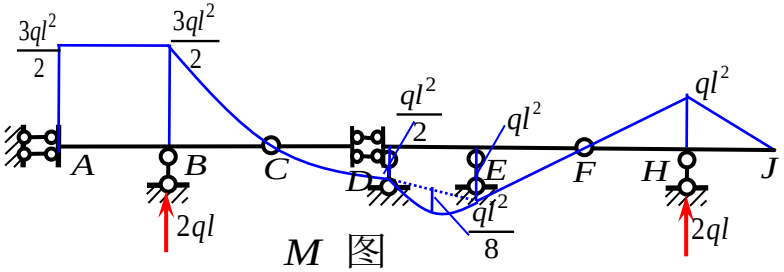


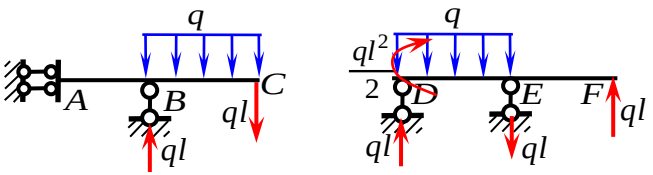


体系为基附型结构，*DE*为附属部分，*ABCD*和*EFH* 都是基本部分，按照先附后基顺序计算。
*AB*段用悬臂梁法得到弯矩图；*CD*段杆件用简支梁法得到弯矩图；*BC*段用微分关系连接*B*、*C*截面弯矩得到弯矩图。
EF 段用简支梁法得到弯矩图；*FH* 段用微分关系连接*F*、*H* 截面弯矩得到弯矩图。

【例题31】弯矩图。（多跨梁1-20）

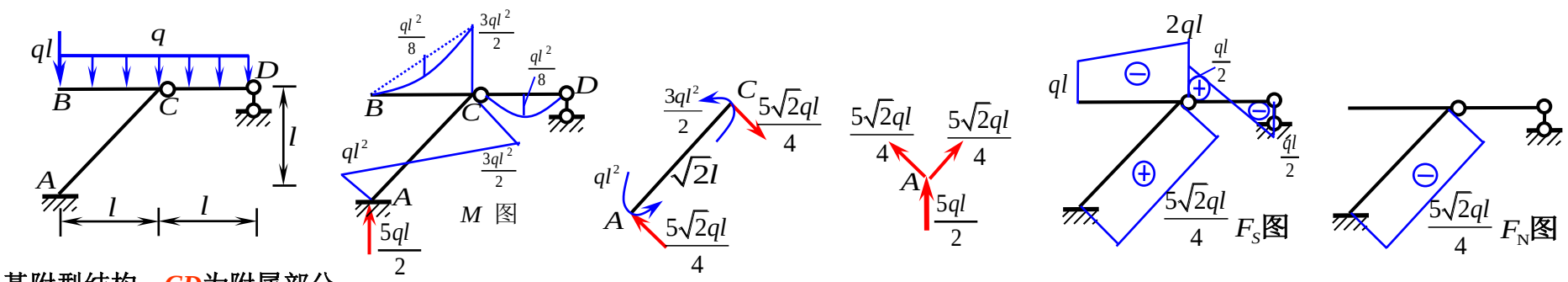






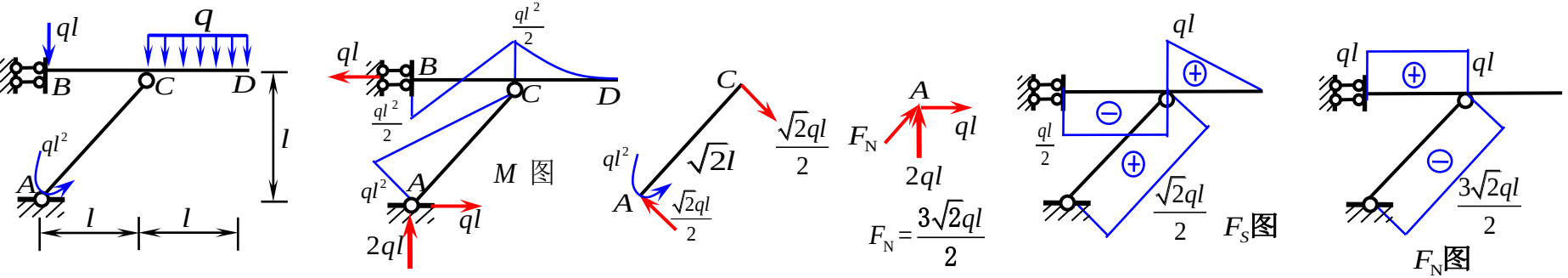
基附型结构， *CD*、*FHJ*为附属部分，
*ABC*和*DEF*都是基本部分，按照先附后基顺序计算。
*CD*段杆件用简支梁法得到弯矩图；*HJ*段用悬臂梁法得到弯矩图；
EF、*FH*两段杆件用微分关系得到弯矩图；*DE*段杆件用简支梁法得到弯矩图。
*BC*段用简支梁法得到弯矩图；*AB*段用微分关系得到弯矩图。

【例题32】内力图。（简单刚架1-34）



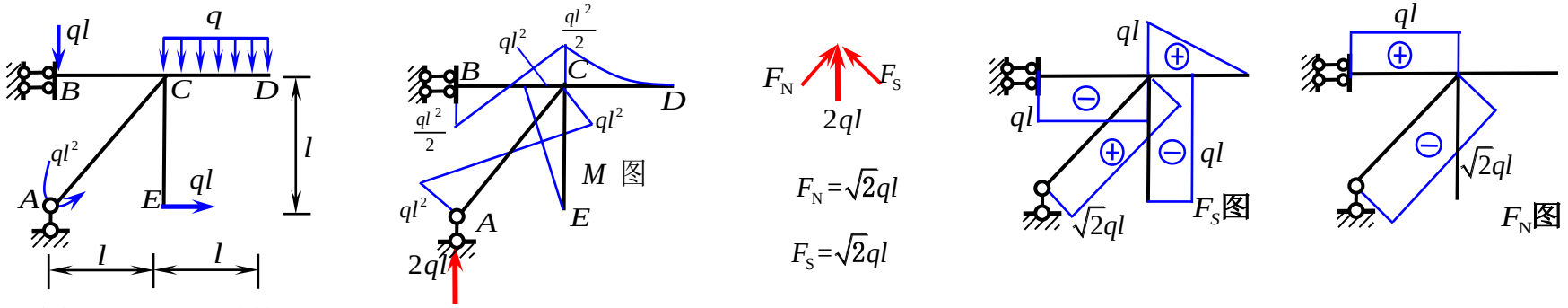
基附型结构，*CD*为附属部分

【例题33】内力图。（简单刚架1-36）



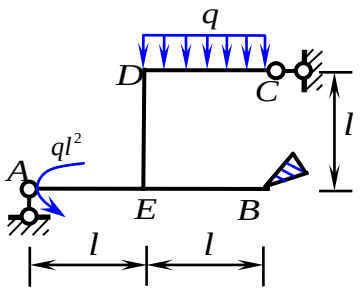
该体系为两刚片组成结构

【例题34】内力图。（简单刚架1-37）



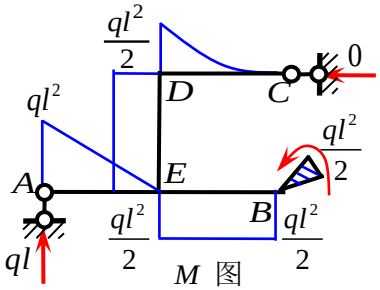
该体系为两刚片组成结构

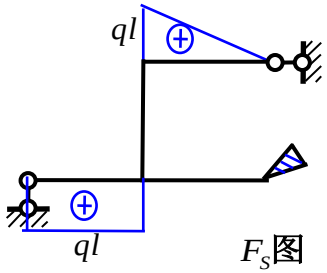
【例题35】弯矩图、剪力图。（简单刚架2-15）



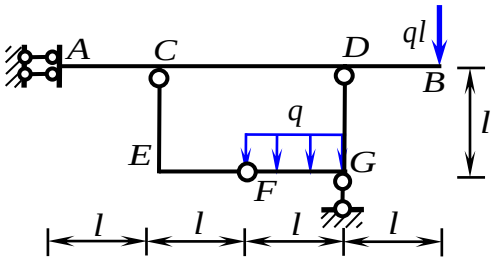
刚臂支座，
限制转动

该体系为两刚片组成结构

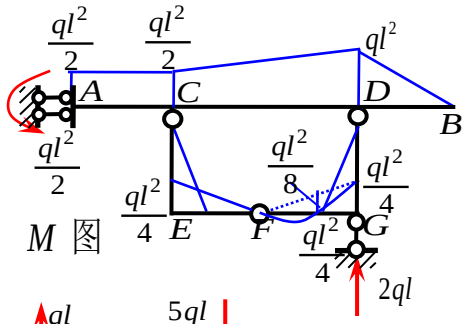


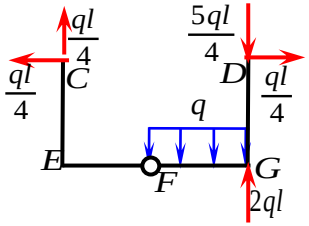


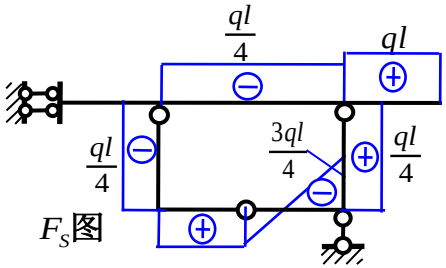
【例题36】内力图。（简单刚架3-9）

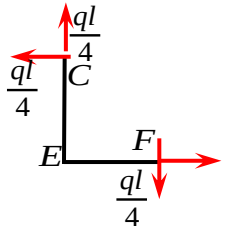


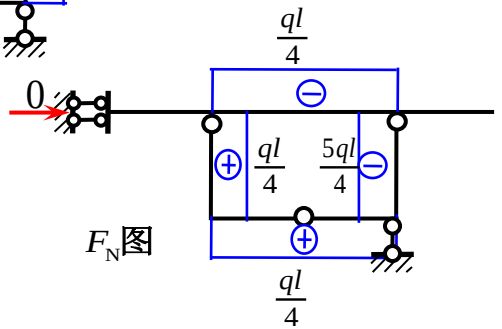
该体系为两刚片组成结构



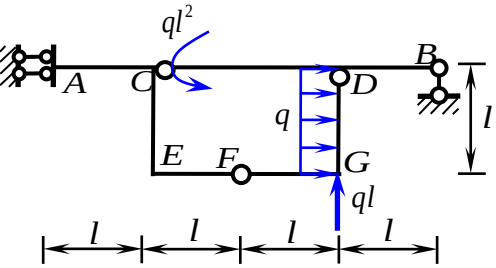


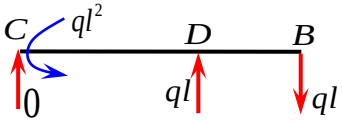


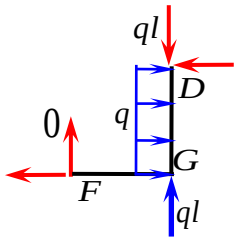


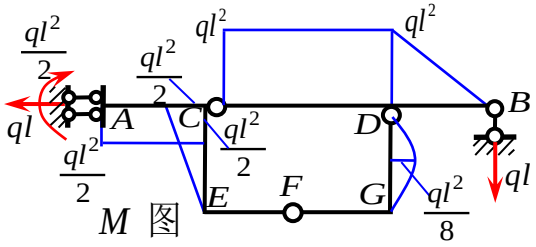


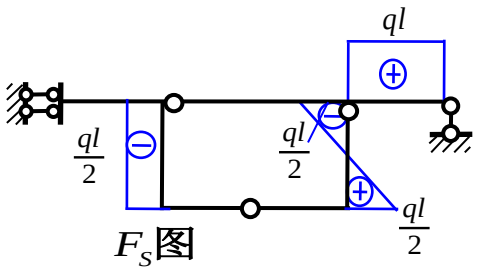
【例题37】弯矩图、剪力图。（简单刚架3-14）





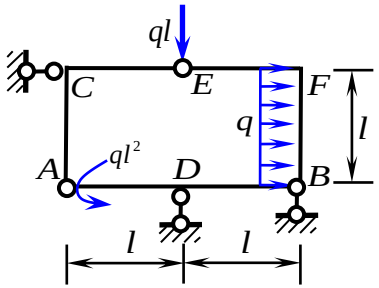


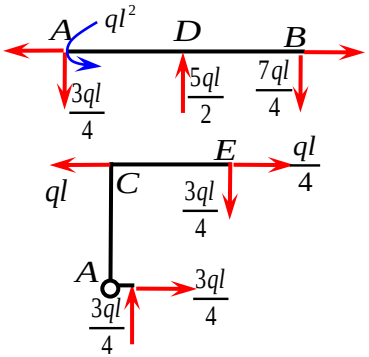


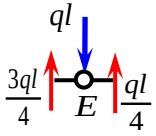


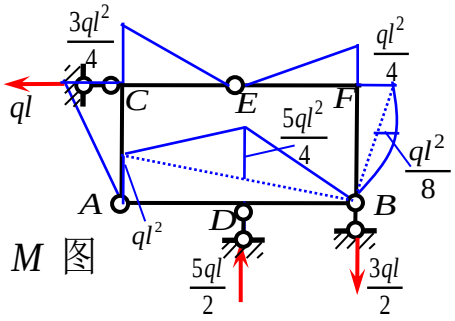
该体系为两刚片组成结构

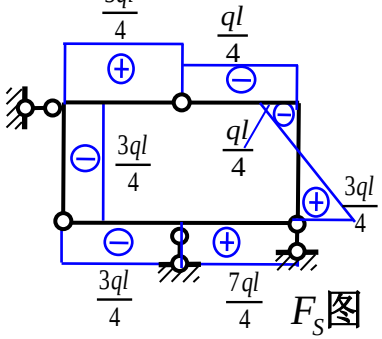
【例题38】弯矩图、剪力图。（简单刚架3-36）





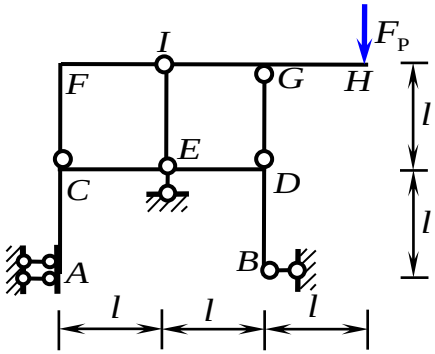


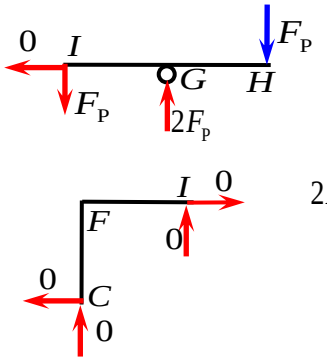


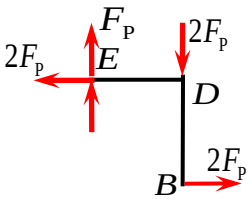


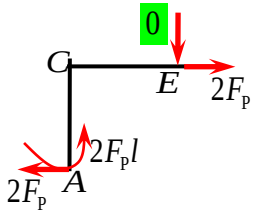
该体系为两刚片组成结构

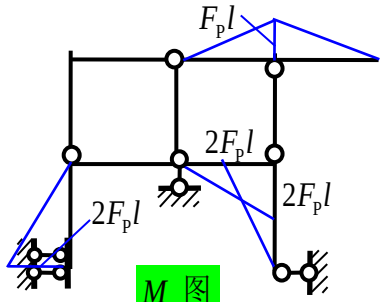
【例题39】弯矩图。（基附型3-23）





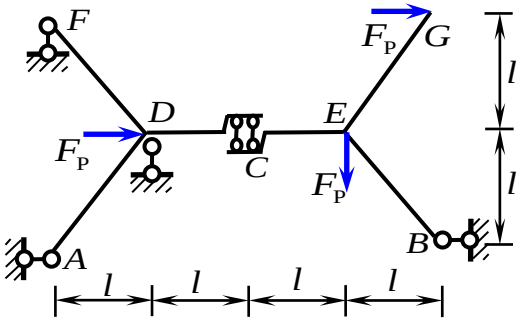


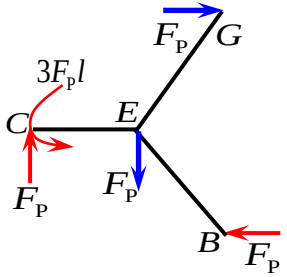


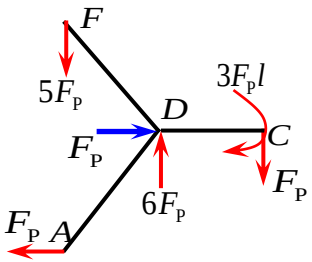


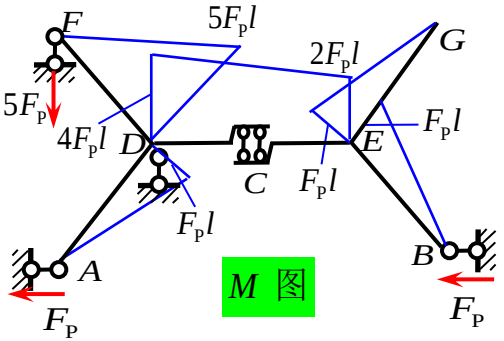
该体系为两刚片组成结构，先附后基。

【例题40】弯矩图。（简单刚架5-17）



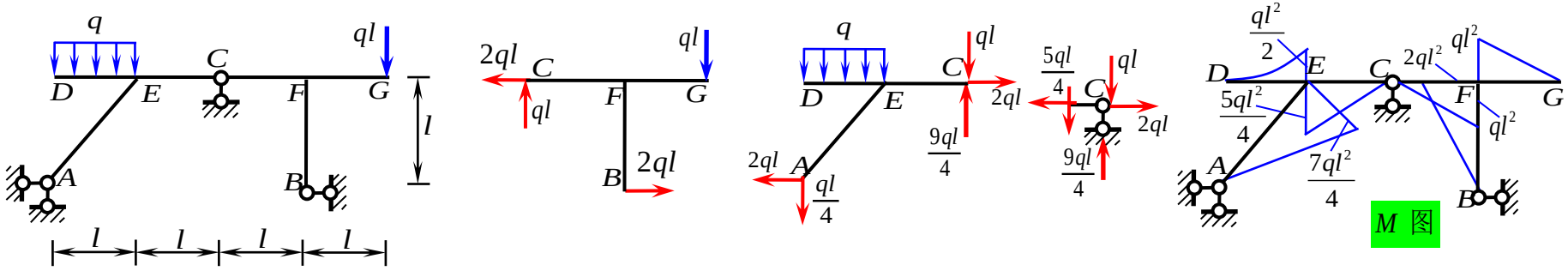






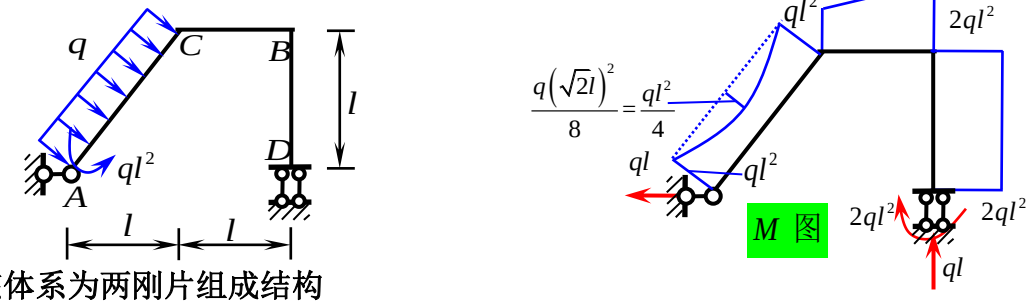
该体系为基附型结构，先附后基

【例题41】弯矩图。（简单刚架5-20）



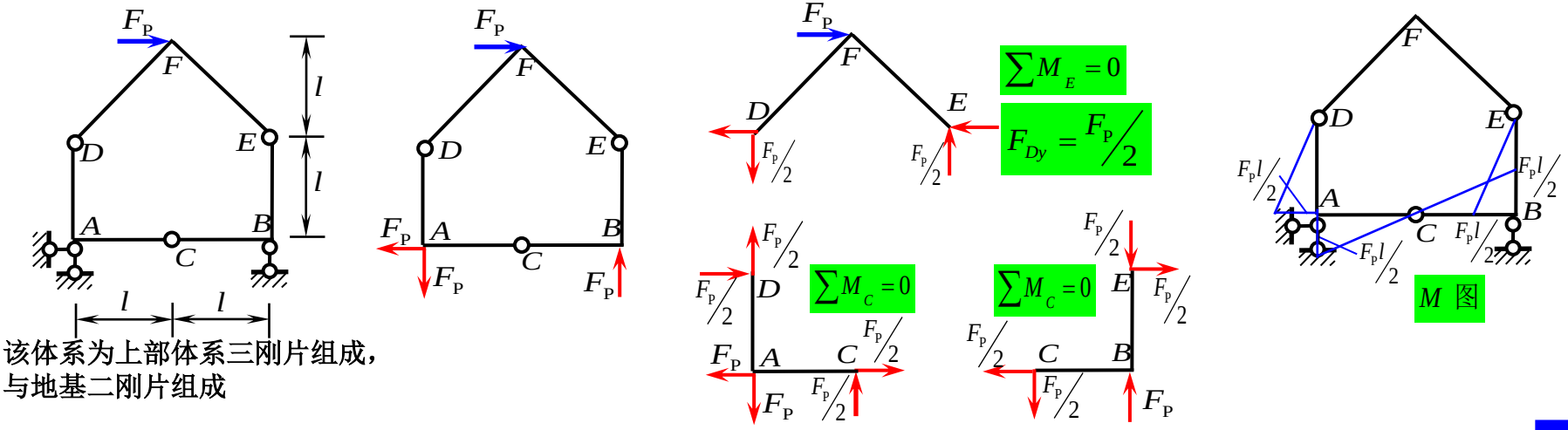
该体系为基附型结构，先附后基

【例题42】弯矩图。（简单刚架5-33）



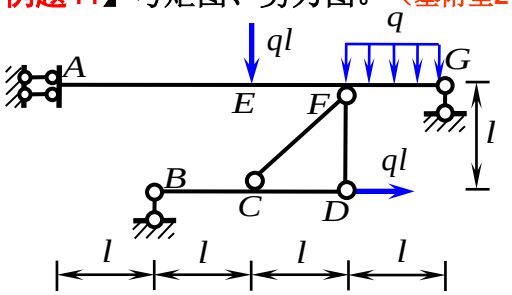
该体系为两刚片组成结构

【例题43】弯矩图。（简单刚架6-38）

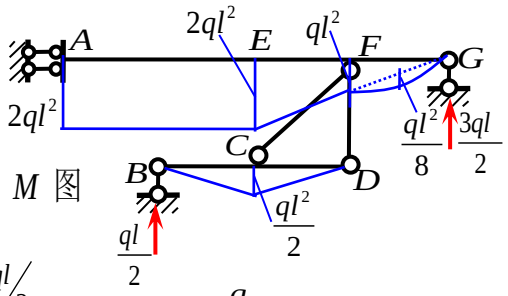


该体系为上部体系三刚片组成，
与地基二刚片组成

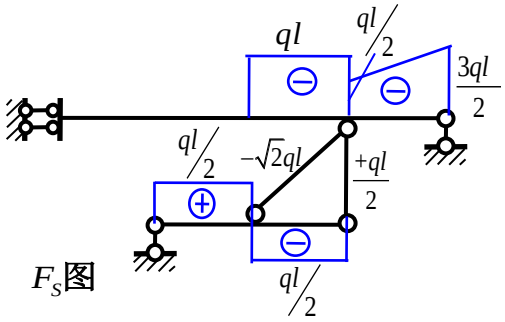
【例题44】弯矩图、剪力图。（基附型2-5）



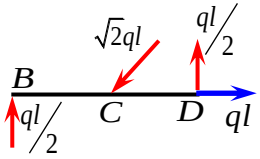
该体系为基附型结构，先附后基。

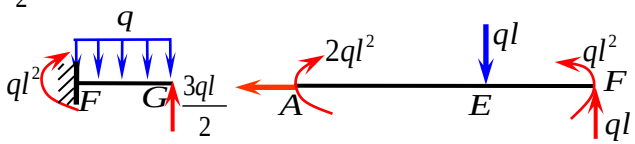


M 图

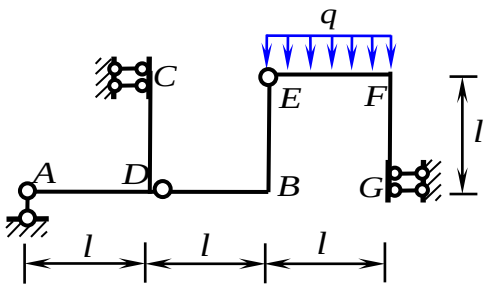


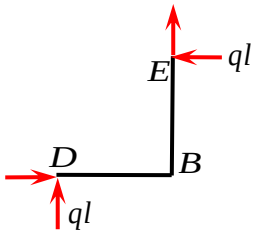
F_S图

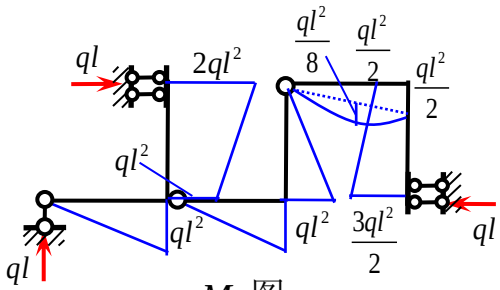




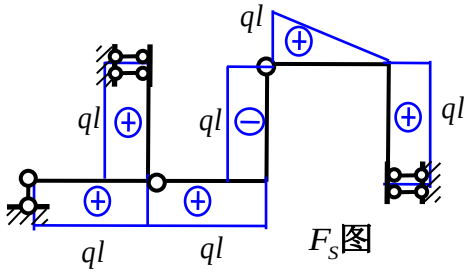
【例题45】弯矩图、剪力图。（基附型2-20）







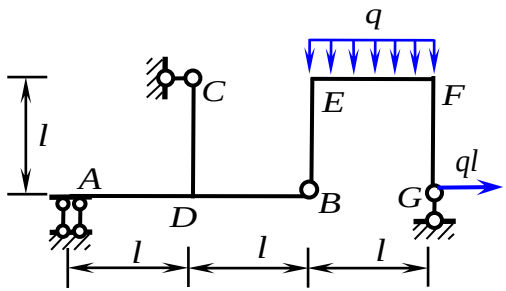
M 图

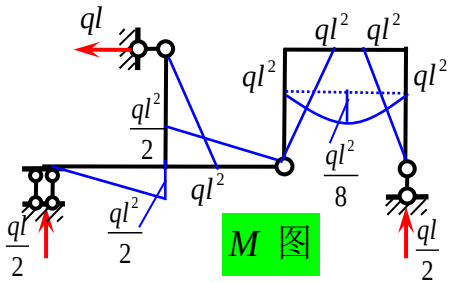


F_S图

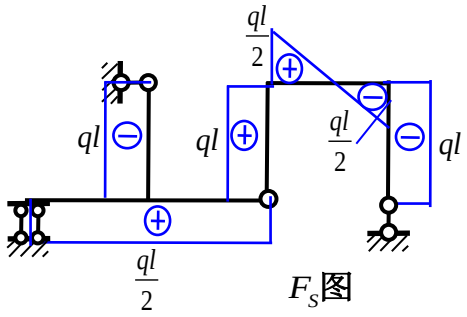
该体系为基附型结构，先附后基。

【例题46】弯矩图、剪力图。（基附型2-23）





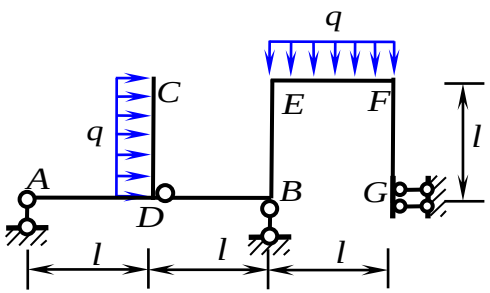
M 图

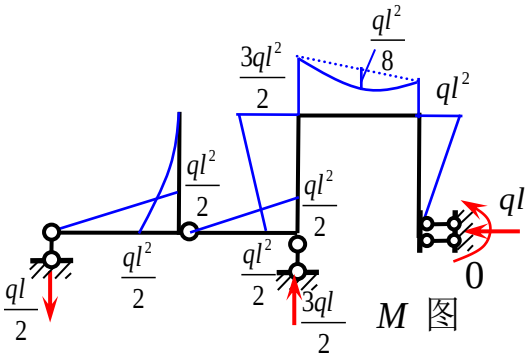


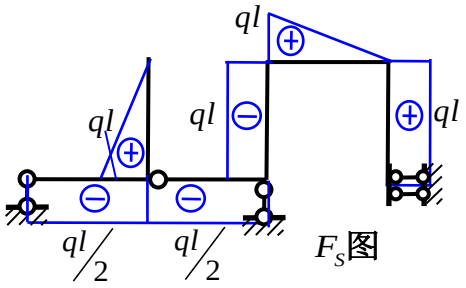
F_S图

该体系为基附型结构，先附后基。

【例题47】弯矩图、剪力图。（基附型2-28）

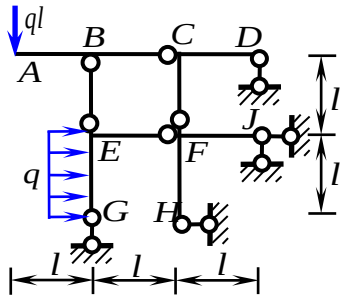


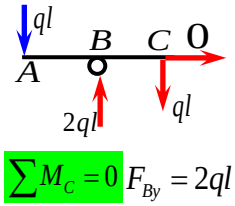


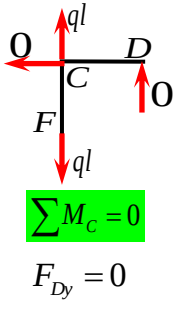


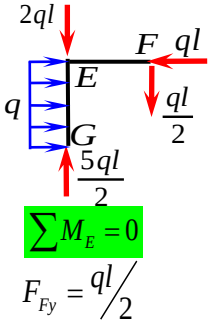
该体系为基附型结构，先附后基。

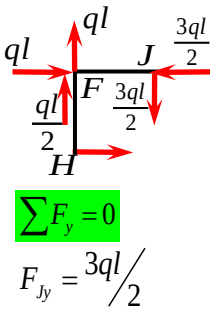
【例题48】弯矩图。（基附型3-28）

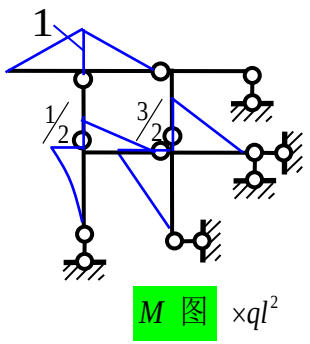






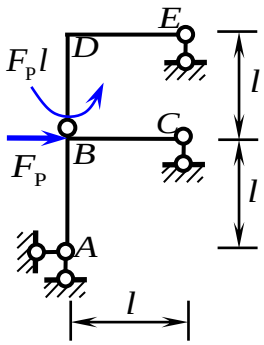


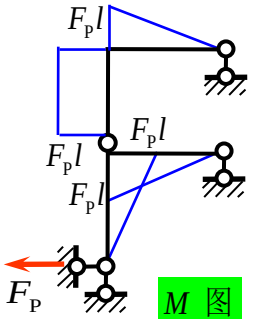


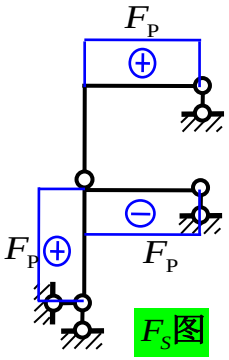


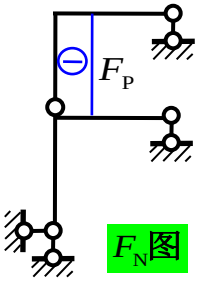
该体系为基附型结构，先附后基。

【例题49】内力图。（基附型3-32）

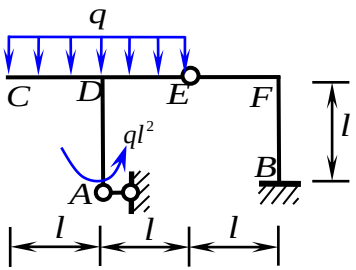


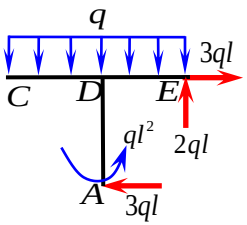






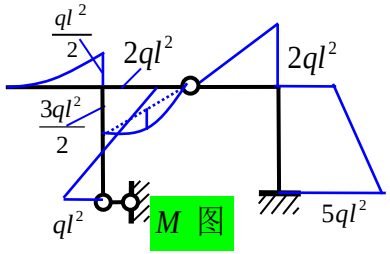
【例题50】弯矩图。（基附型3-36）





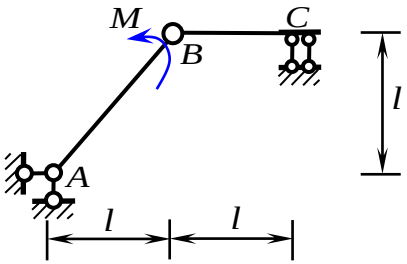
$\sum F_y = 0 \quad F_{Ey} = 2ql$

$\sum M_E = 0 \quad F_{Ax} = 3ql$



该体系为基附型结构，先附后基。

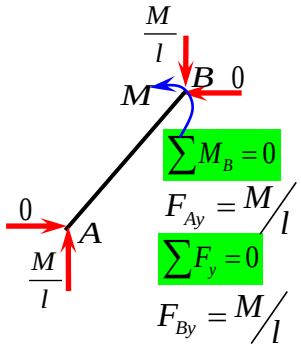
【例题51】弯矩图。（基附型3-39）



整体隔离体：

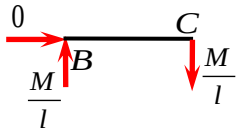
$\sum F_x = 0$

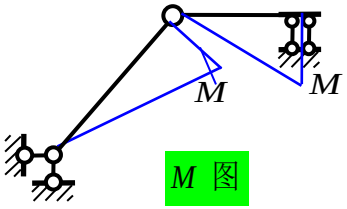
$F_{Ax} = 0$



$\sum M_B = 0 \quad F_{Ay} = M/l$

$\sum F_y = 0 \quad F_{By} = M/l$





【例题2】弯矩图。（对称1-2）