Approximate method For analysis of Frames

Unbraced Frame

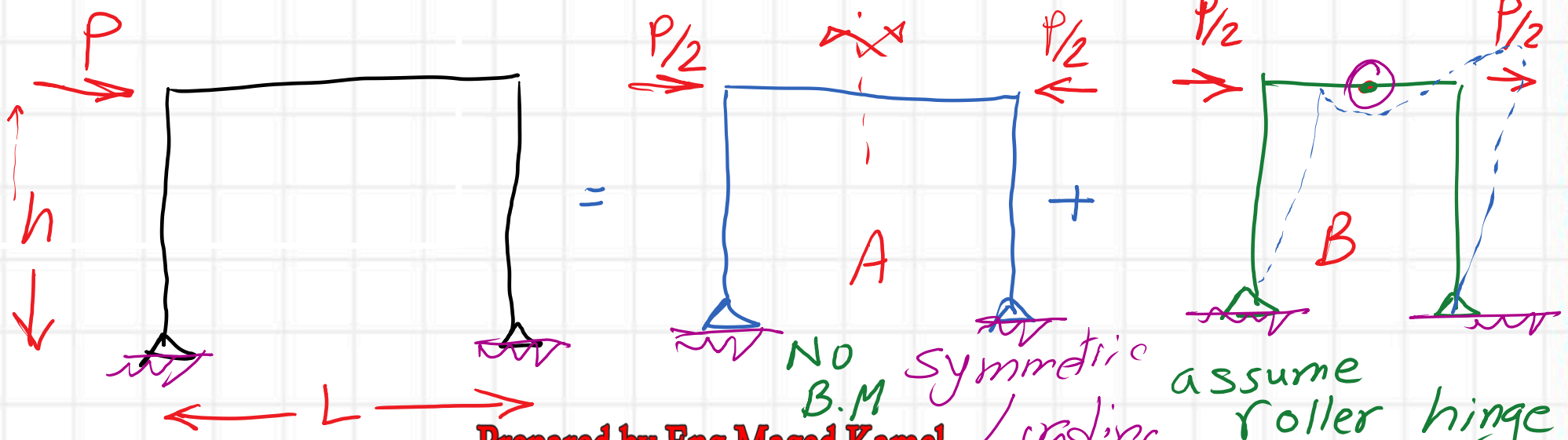
For other conditions include a correction factor "*m*" to account for actual rotational stiffness of the girder at the joint.

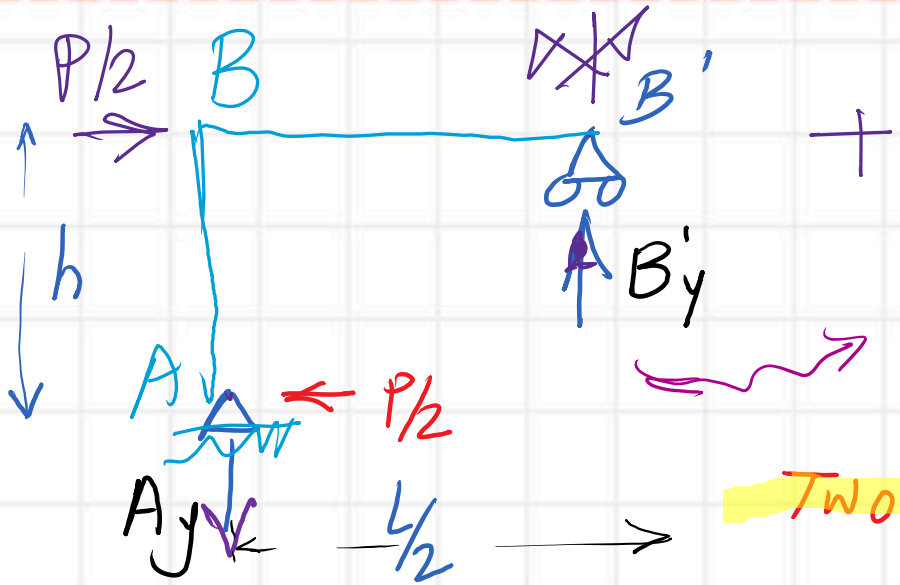
$$G = \frac{\sum\left(\frac{EI}{L}\right)_{columns}}{\sum\left(m\frac{EI}{L}\right)_{girders}}$$

Sidesway Uninhibited (Sway)
Assumption: reverse curvature bending of girder.

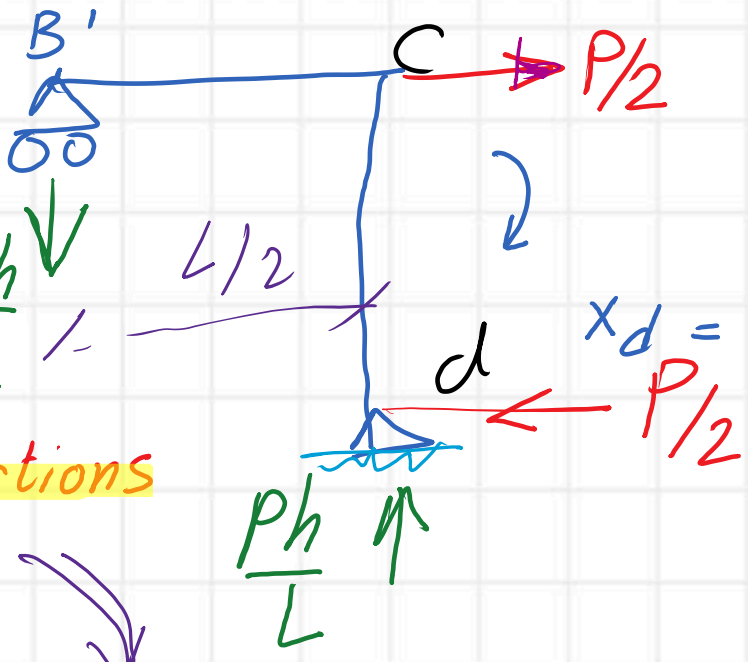
R.C Hibbler Structural analysis

First Case two hinged supports at the base





Two-portions



antisymmetric Loading

$\sum F_x = 0$

$x_d = P/2 \leftarrow$

$\sum F_x = 0$

$A_x = P/2 \leftarrow$

$\sum M_A = 0$

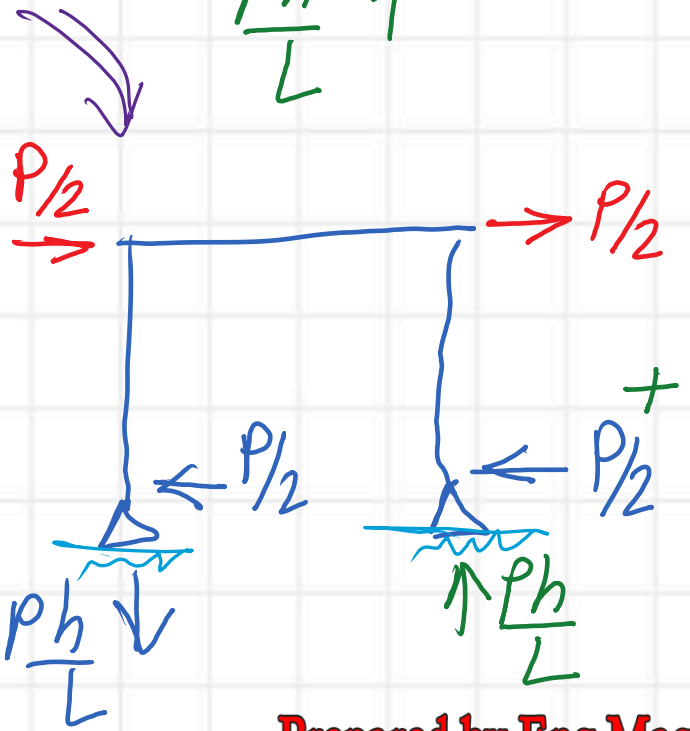
$B'_y (\frac{L}{2}) = \frac{P}{2}(h)$

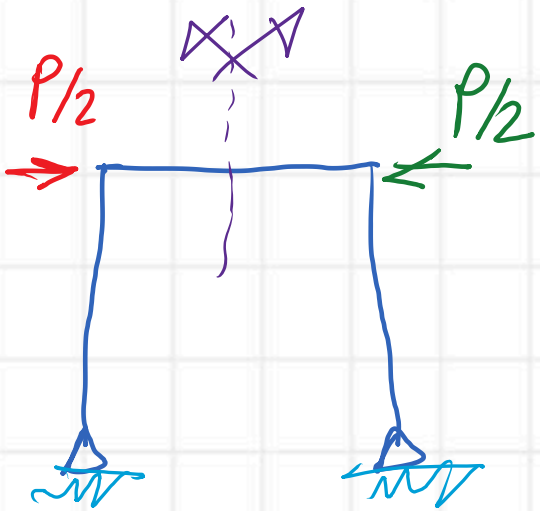
$B'_y = \frac{Ph}{L} \uparrow$

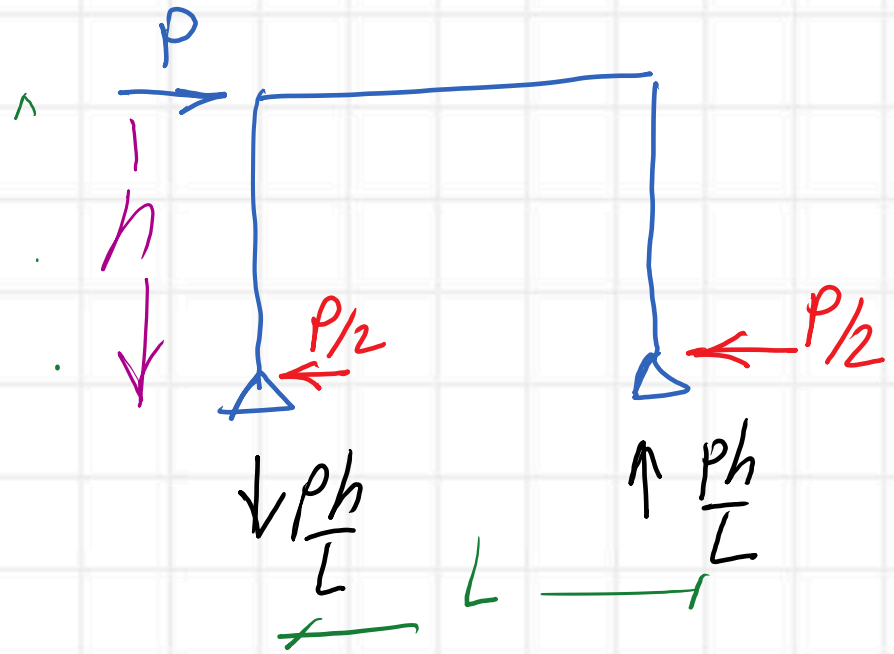
$\sum F_y = 0$

$A_y + B'_y = 0$

$A_y = \frac{Ph}{L} \downarrow$







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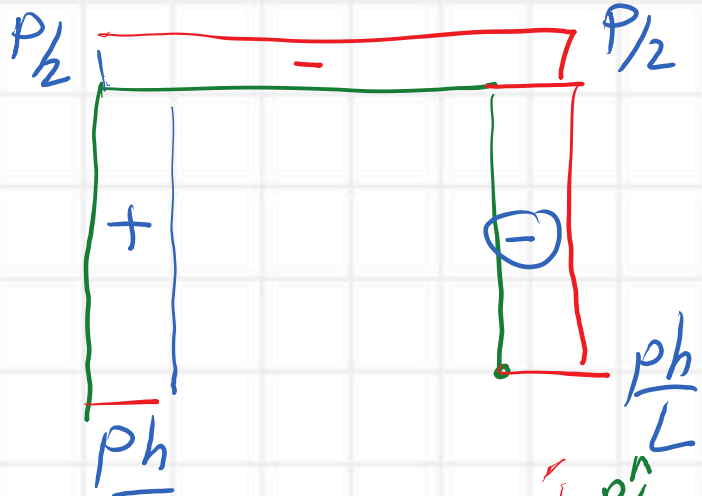
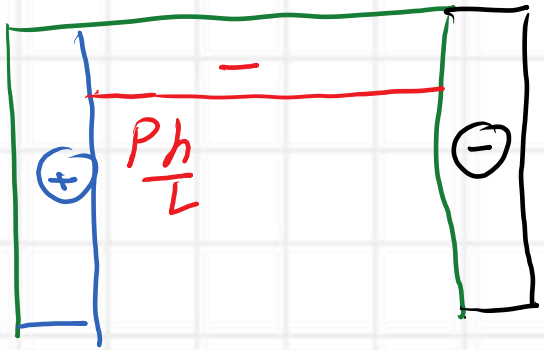
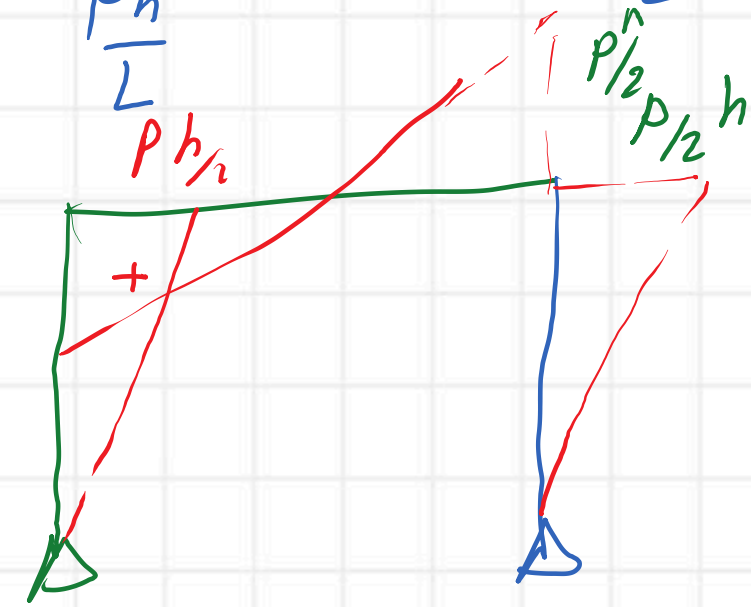


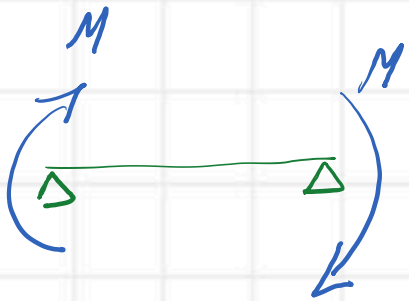
N.F.D



S.F.D

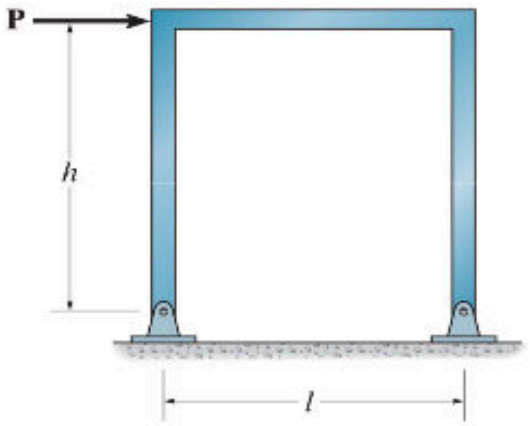


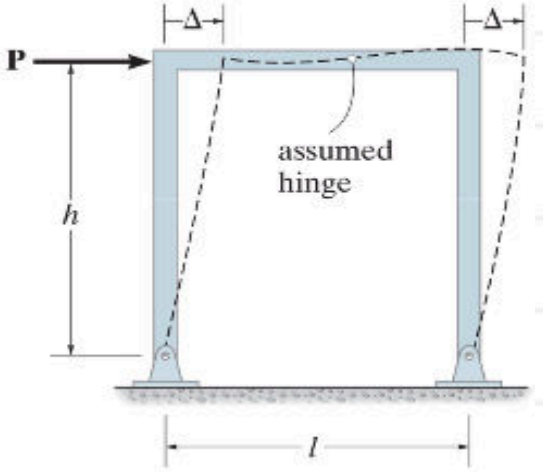
B.M.D



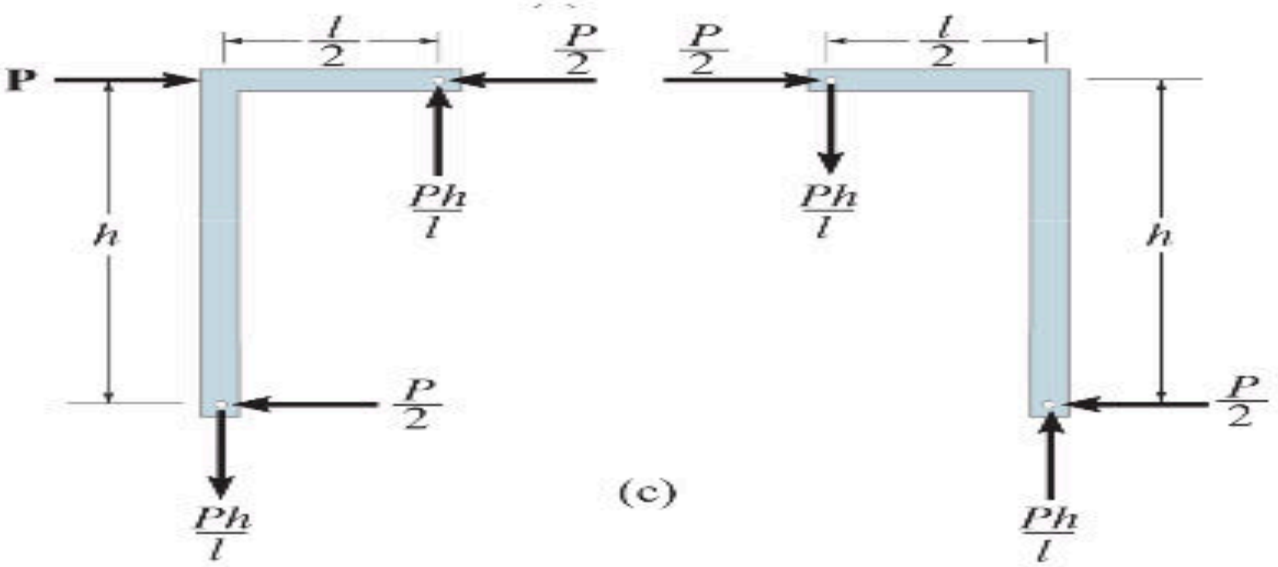
Portal Frames and Trusses

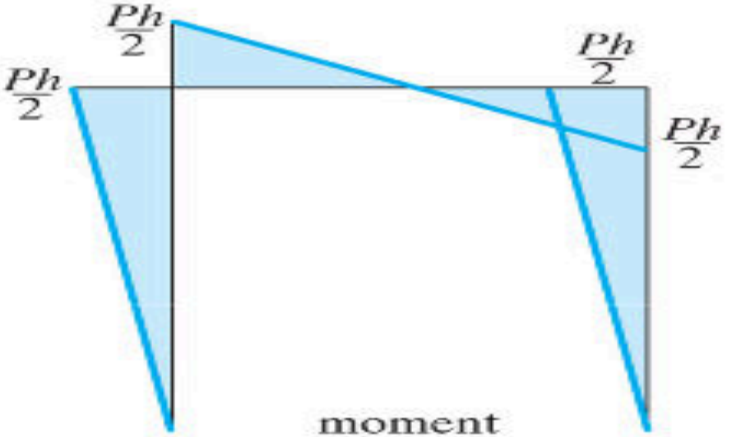
Case 1: Pin supported





(b)



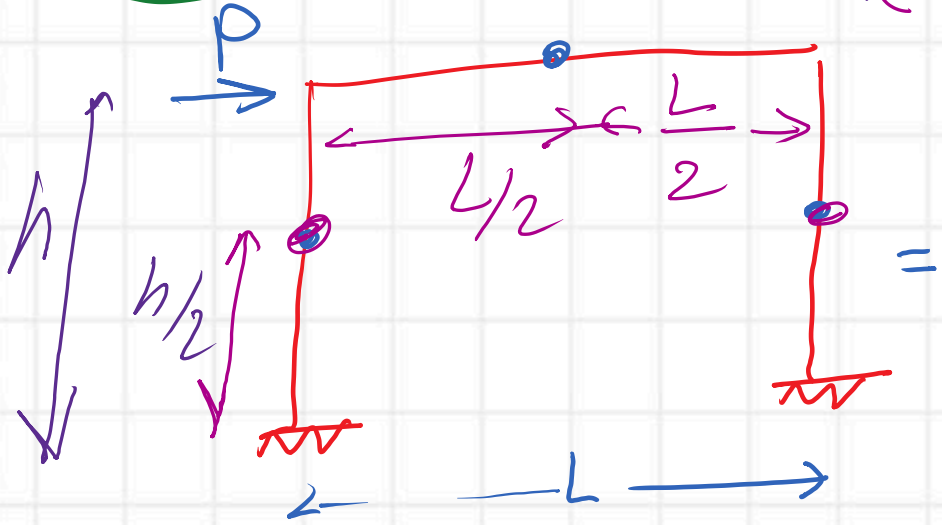


(d)

Figure: 07_07c

Prepared by Eng.Maged Kamel.

Second Case: Frame (Two Fixed supports)



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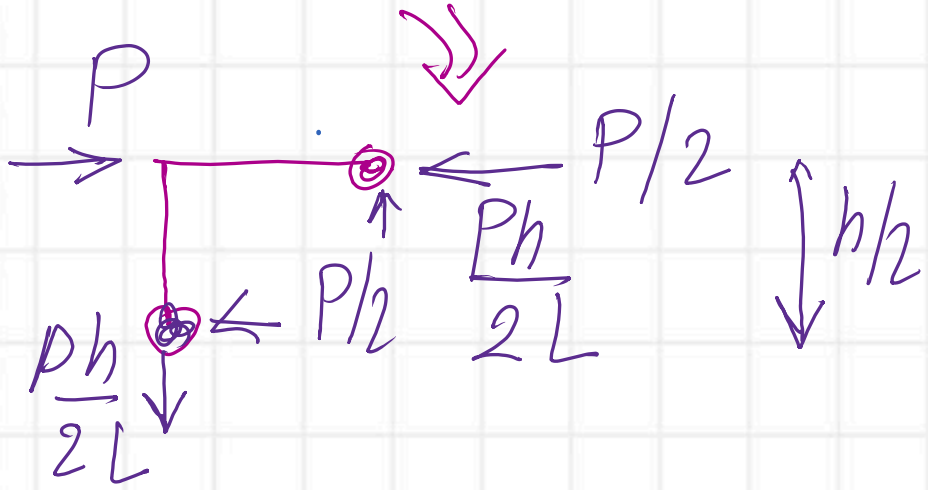
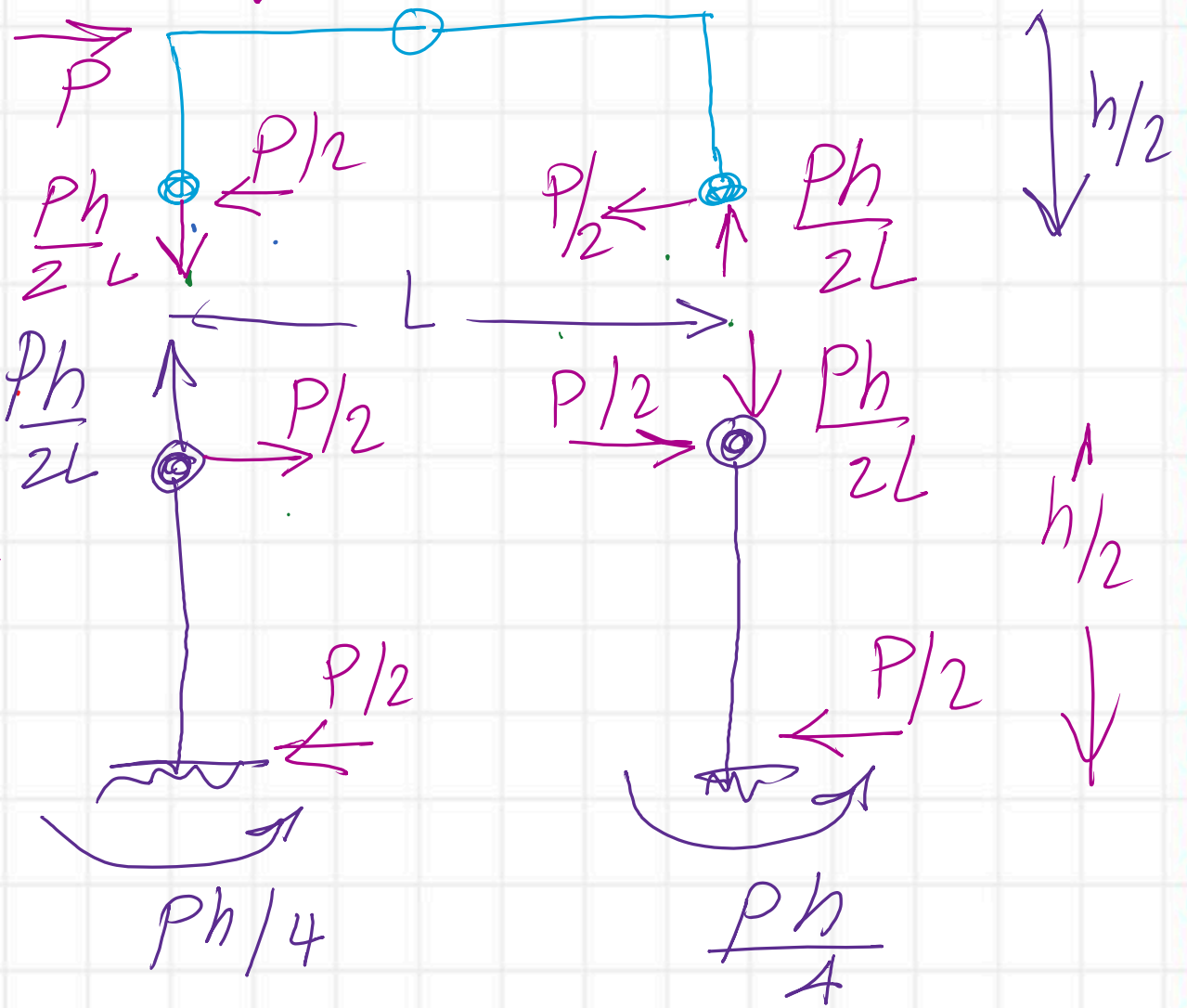
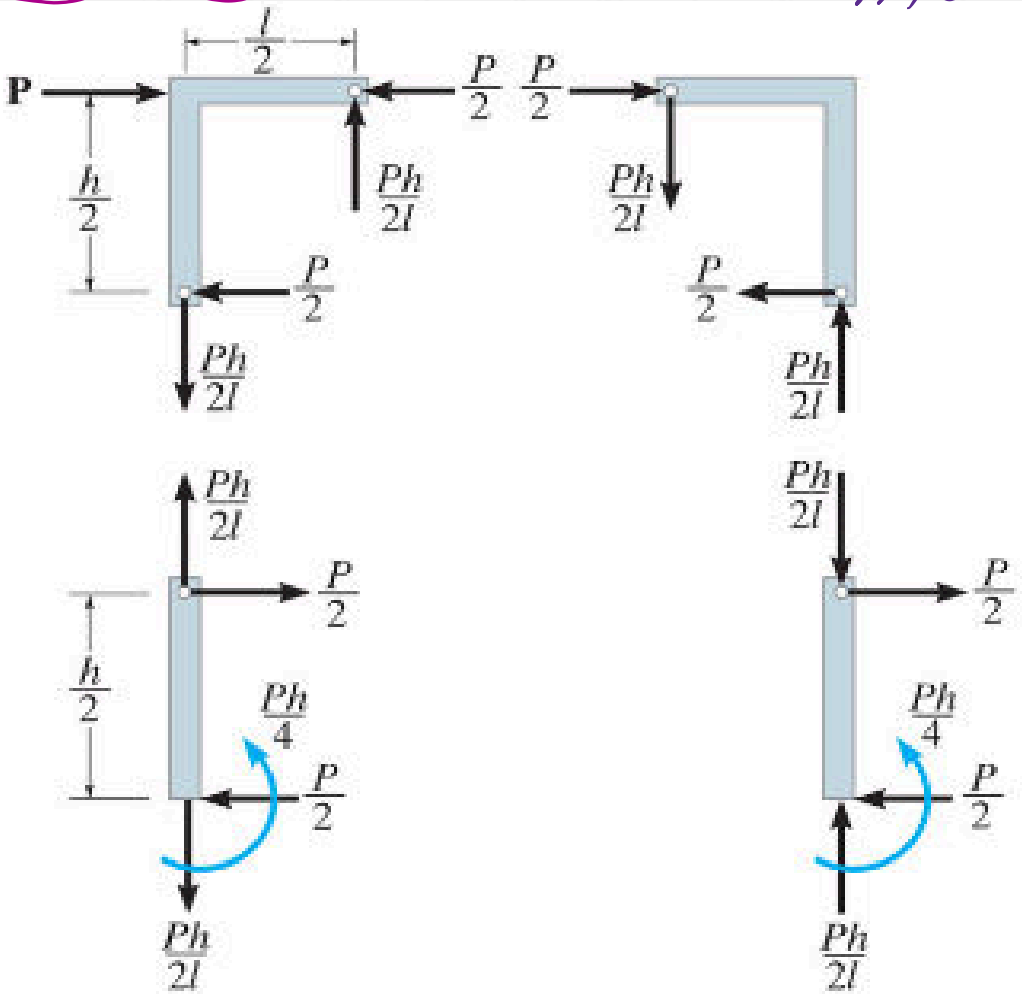
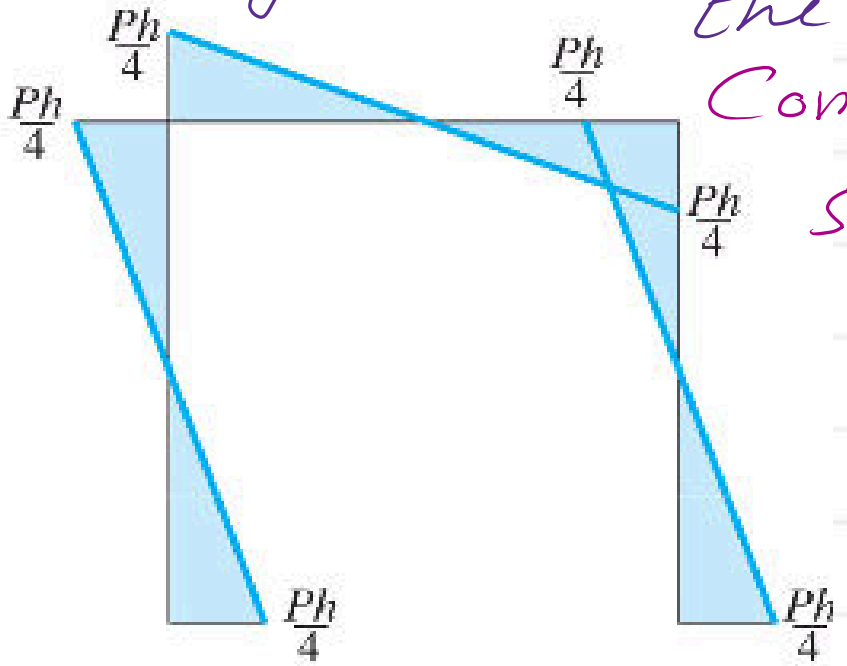




Fixed base

moment diagram Drawn on the Compression side





moment diagram

(d)

Figure: 07_08d

chapter-7 : approximate anaysis of statically indeterminate

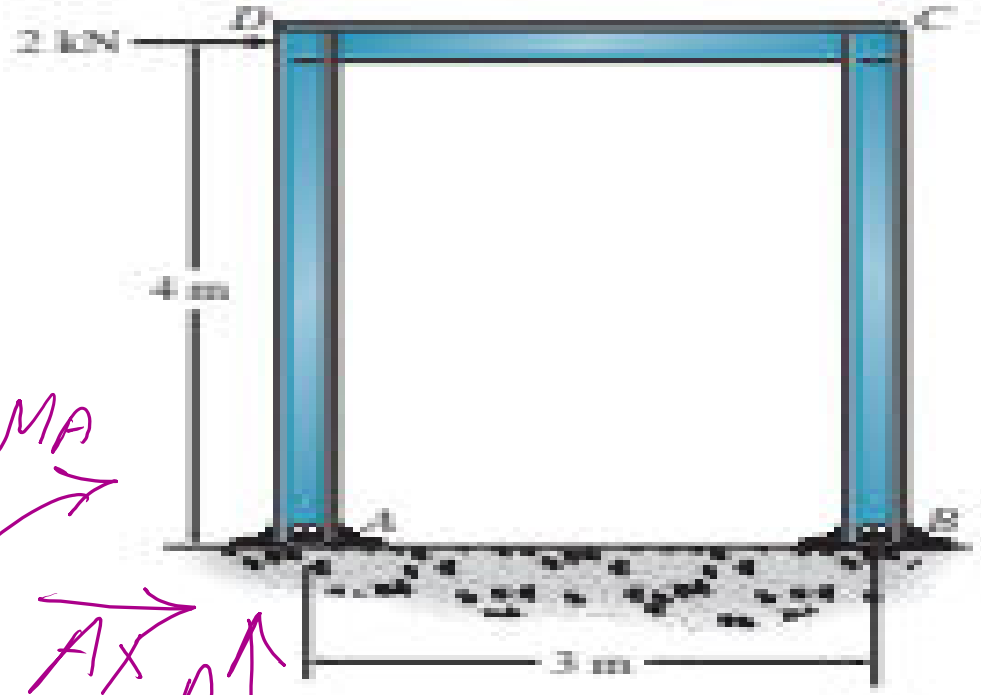
Hibbler

Practice Problem

12-19 Metric

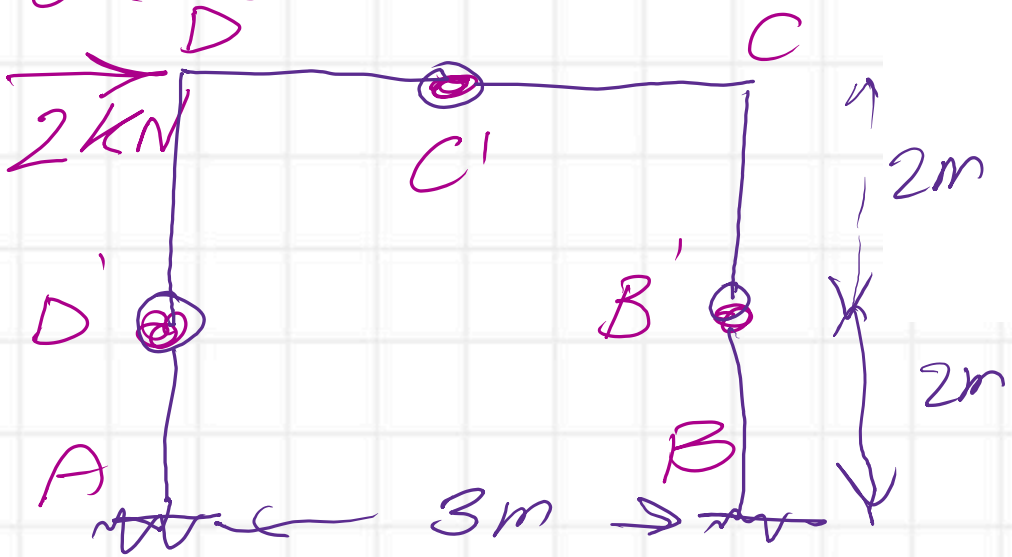
(a) Case of two Fixed support

12–19. Determine (approximately) the internal moment at joints C and D. Assume the supports at A and B are fixed.



Prob. 12–19

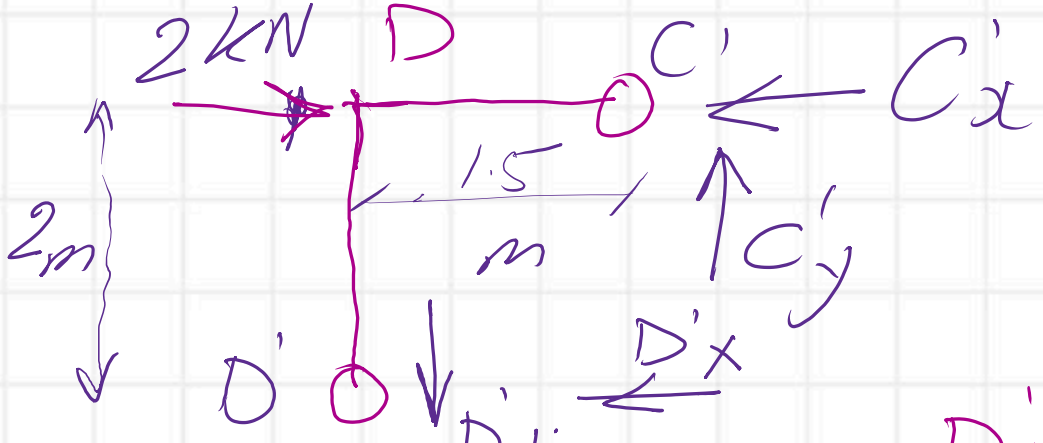
Solution: assume Three hinged which are Located as shown



$h = 4\ m$

$L = 3\ m$

$P = 2\ kN$



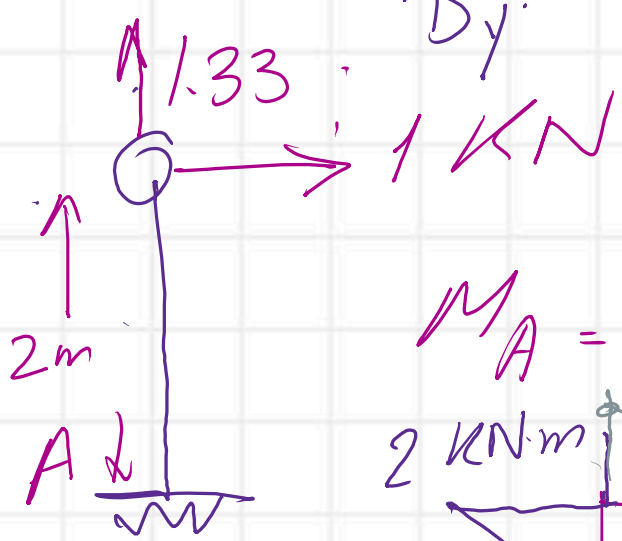
From the previous discussion

$$C'x = \frac{2}{2} = 1\ kN \leftarrow$$

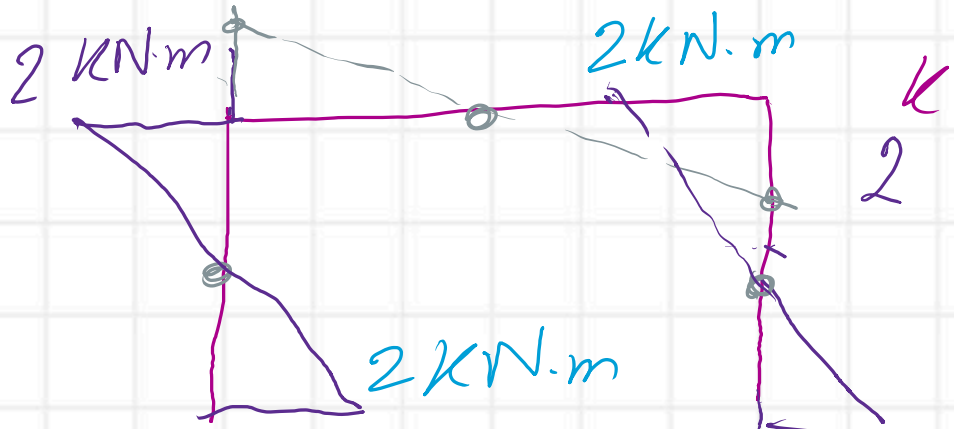
$$C'y = \frac{Ph}{24} = \frac{2(4)}{2(3)} = 1.33\ kN \uparrow$$

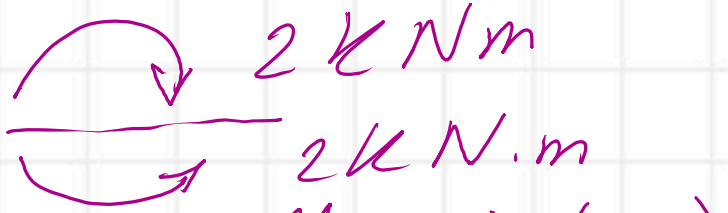
$$D'y = -C'y = 1.33\ kN \downarrow$$

$$D'x = \frac{2}{2} = 1\ kN \leftarrow$$



$$M_A = 1(2) = 2\ kN.m$$





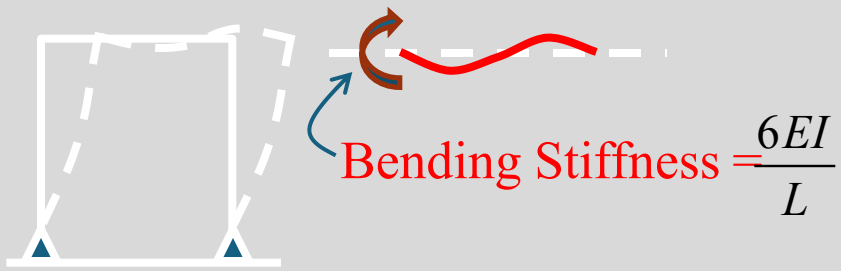
$$M_D = C'y(1.5)$$

$$M_D = Ph/4 = 2(4)/4 = 2\ kN.m$$

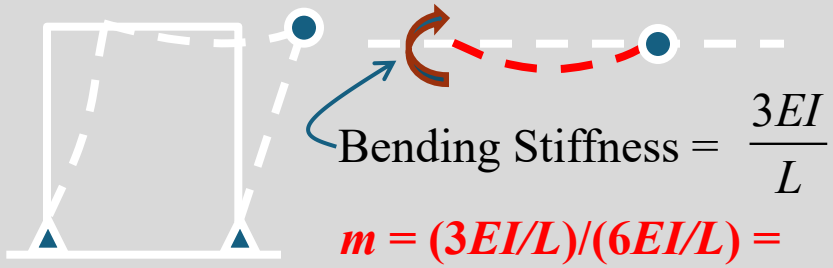
Post – 15

Alignment Charts

http://www.ecs.umass.edu/cee542/

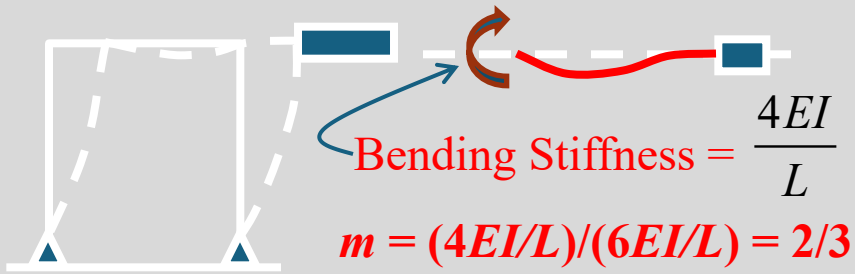


Sidesway Uninhibited (Sway)
Assumption: reverse curvature bending of girder.



$m = (3EI/L)/(6EI/L) = 1/2$

Far end pinned



$m = (4EI/L)/(6EI/L) = 2/3$

Far end fixed

Prepared by Eng.Maged Kamel.