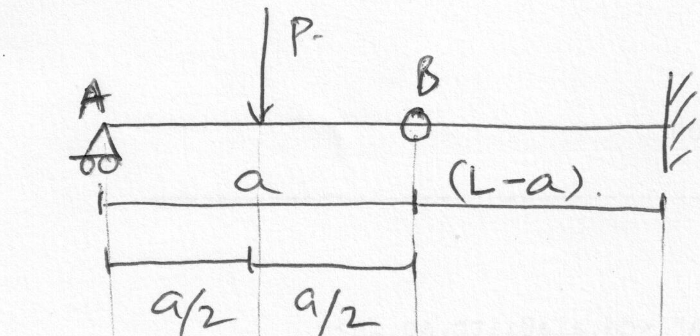
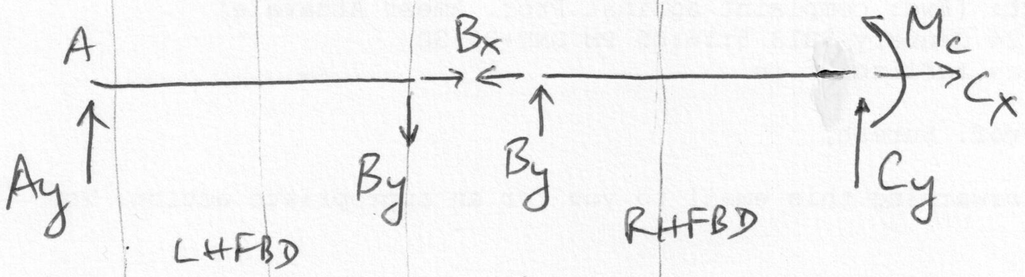
(5)




Statically determinate

$\sum$ Moments about hinge for LHFBD

$\Rightarrow A_y = P/2 = -B_y$

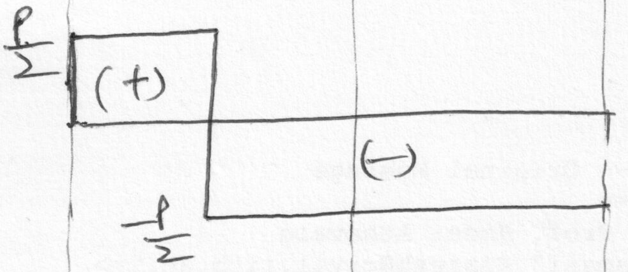


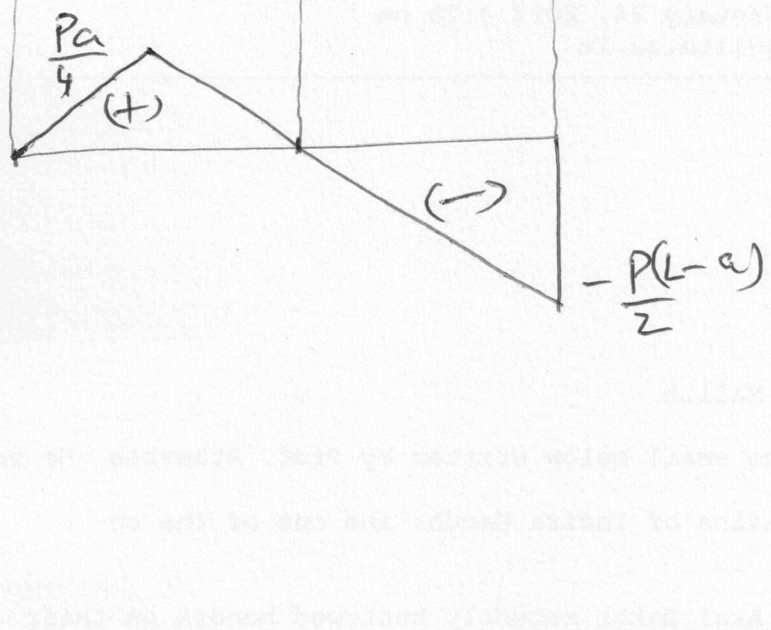

$\sum$ Moments about C for RHFBD

$\Rightarrow M_c = -\frac{P}{2}(L-a)$

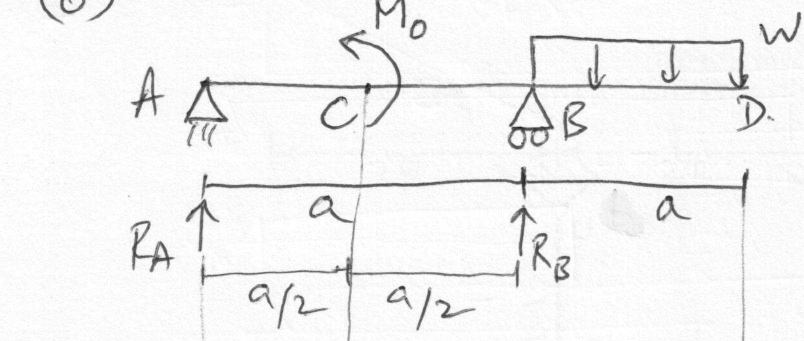
Also $B_x = 0 = C_x$. (from horizontal equilibrium).

SFD



(6) <u>NOTE</u>: $M_0$, $w$, positive in directions shown.

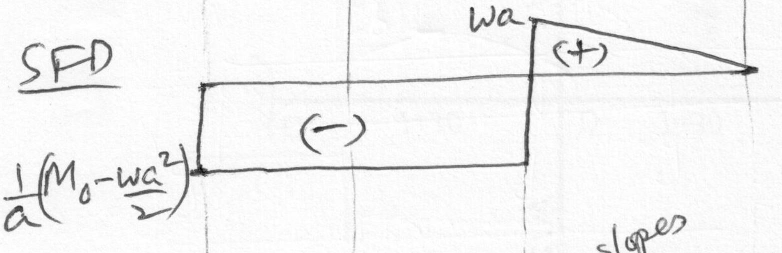



$$R_A = \frac{1}{a}\left(M_0 - \frac{wa^2}{2}\right)$$

$$R_B = wa - \frac{1}{a}\left(M_0 - \frac{wa^2}{2}\right)$$

<u>Case I</u> $M_0 < \dfrac{wa^2}{2}$

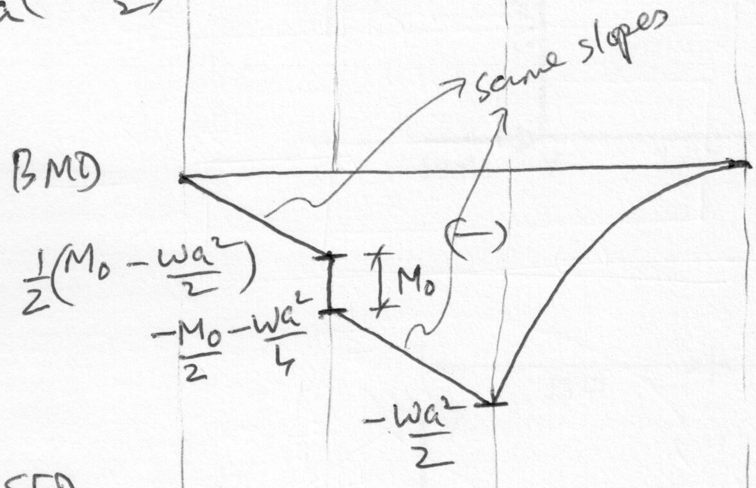
$$\Rightarrow R_A < 0,\ R_B > 0$$

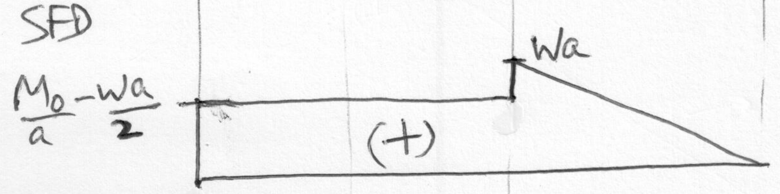



$$M_{C^-} = \frac{\cancel{a}}{2}\cdot\frac{1}{\cancel{a}}\left(M_0 - \frac{wa^2}{2}\right)$$

$$M_{C^+} = M_{C^-} - M_0$$
$$= -\frac{M_0}{2} - \frac{wa^2}{4}$$

$$M_B = M_{C^+} + \frac{\cancel{a}}{2}\cdot\frac{1}{\cancel{a}}\left(M_0 - \frac{wa^2}{2}\right)$$
$$= -\frac{wa^2}{2}$$



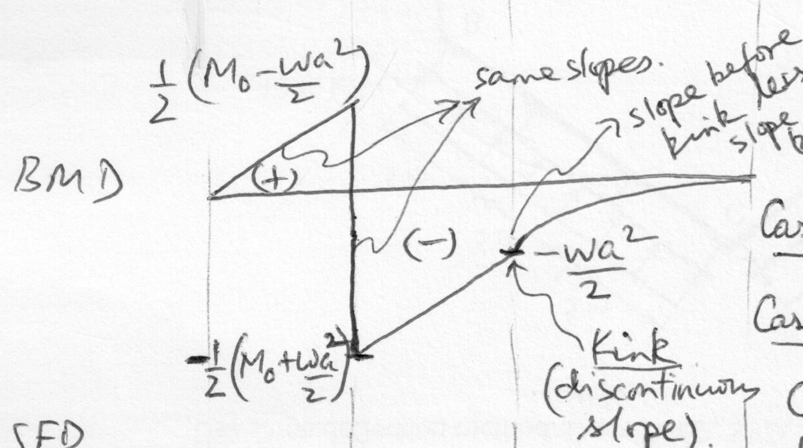

<u>Case II</u> $M_0 > \dfrac{wa^2}{2}$

$$\Rightarrow R_A > 0$$

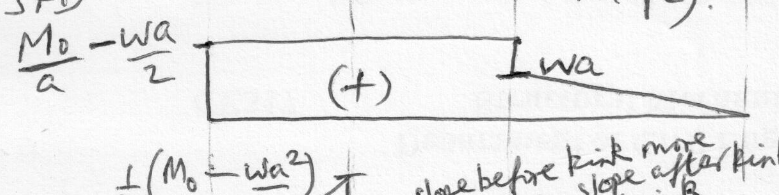
ie, $\dfrac{M_0}{a} > \dfrac{wa}{2}$

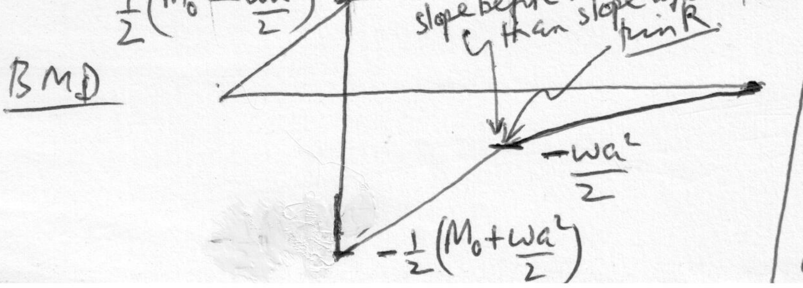
<u>Case IIa</u> ← $R_B > 0$ if $\frac{3}{2}wa > M_0/a$

<u>Case IIb</u> ← $R_B < 0$ if $\frac{3}{2}wa < M_0/a$




<u>Case IIa</u> & <u>Case IIb</u> (same as case I)
$$\left.\begin{aligned} M_{C^-} &= \frac{1}{2}\left(M_0 - \frac{wa^2}{2}\right) \\ M_{C^+} &= -\frac{M_0}{2} - \frac{wa^2}{4} \\ M_B &= -\frac{wa^2}{2} \end{aligned}\right\} \rightarrow \text{same as case I}$$




<u>NOTE</u>: (1) BM values at $C^+$, $C^-$, B, same for Cases IIa, IIb and same but negative for case I

(2) SFD in Case IIa has upward jump & in case IIb downward jump.

(3) Slope before kink in BMD less than after kink in Case IIa & vice versa in Case IIb

(4) ∵ $M_0/a > \frac{3}{2}wa$ in Case IIb, shear force at 'A' higher, hence slope of str line BMD more than in Case IIb.