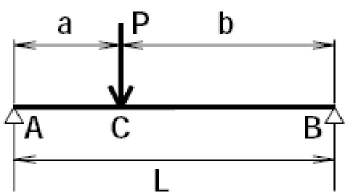
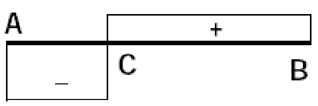
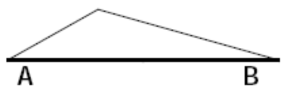
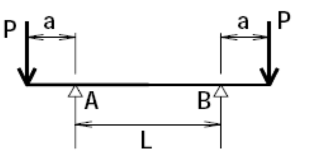
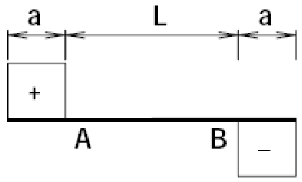
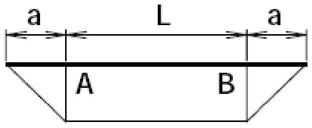
FORMULAIRE DES CAS DE CHARGES COURANTS EN FLEXION

I/ Notations

A	Appui de gauche
B	Appui de droite
Droite (AB)	Ligne moyenne continue représentative des centres de surface des sections le long de la poutre
P	Intensité de la charge concentrée appliquée
q	Intensité de la charge répartie appliquée
C,D	Points d'application des charges
a,b	Distance entre un des appuis et la charge
R_A, R_B	Réactions des appuis A et B sur la poutre AB
V_A, V_B	Efforts tranchants aux appuis A et B
$V_{\overline{AB}}$	Effort tranchant entre les points A et B
V_{dA}	Effort tranchant à droite du point A
V_{gA}	Effort tranchant à gauche du point A
x	Abscisse d'une section courante
x_0	Abscisse de la section dans laquelle s'exerce le moment de flexion maximal
M(x), V(x)	Moment de flexion et effort tranchant dans la section d'abscisse x
M_0	Moment de flexion maximal dans la poutre AB
θ_A, θ_B	Rotation des sections en A et B
f	Flèche

II/ Poutre sur deux appuis simples

	Effort tranchant	Moment de flexion	Observations
 $R_A = \frac{P.b}{L}$ $R_B = \frac{P.a}{L}$ Charge concentrée P	 $V_{\overline{AC}} = -R_A$ $V_{\overline{CB}} = R_B$	 $M_0 = \frac{P.a.b}{L}$ pour $x_0 = a$	La flèche est maximale pour $x = \sqrt{\frac{L^2 - b^2}{3}}$ $f = -\frac{Fb(L^2 - b^2)^{3/2}}{9\sqrt{3}E.I.L}$ $\theta_A = \frac{F.a.b.(L+b)}{E.I.L}$ $\theta_B = \frac{F.a.b.(L+a)}{E.I.L}$
 $R_A = P$ $R_B = P$ Charges concentrées sur porte-à-faux	 $V_{gA} = P$ $V_{dB} = -P$ $V_{\overline{AB}} = 0$	 $M_0 = -P.a$	Moment constant de A à B.

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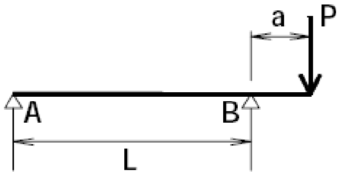
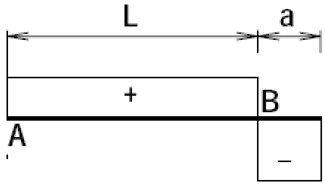
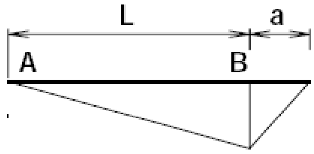
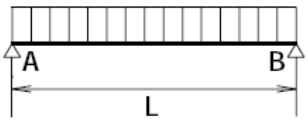
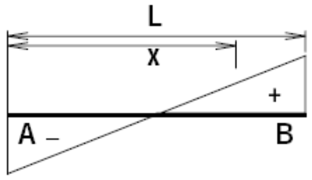
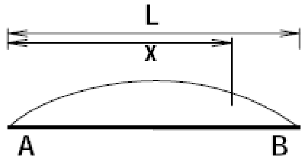
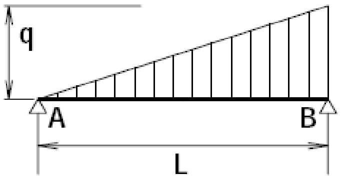
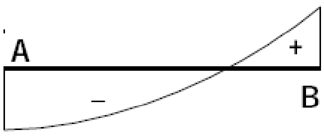
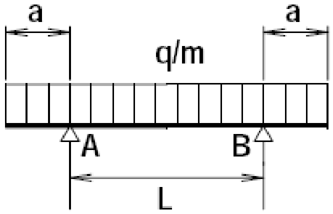
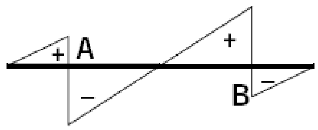
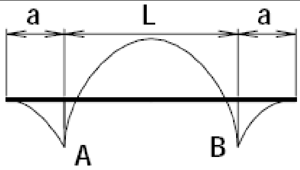
 $R_A = -\frac{P.a}{L}$; $R_B = \frac{P.(L+a)}{L}$ Charge concentrée sur un porte-à-faux	 $V_{\overline{AB}} = -R_A \quad V_{dB} = P$	 $M_0 = M_B = -P.a$	Sens des actions aux appuis : R_A : vers le bas. R_B : vers le haut.
 $R_A = \frac{qL}{2} \quad R_A = R_B$ Charge uniformément répartie	 $V_A = -\frac{qL}{2} \quad V_A = -V_B$ $V(x) = \frac{q.L^2}{2} - q.x$	 $M_0 = \frac{q.L^2}{8}$ pour $x_0 = \frac{L}{2}$ $M(x) = \frac{q.x}{2}(L-x)$	Flèche $f = \frac{5}{384}.\frac{qL^4}{EI}$ pour $x = \frac{L}{2}$ $-\theta_A = \theta_B = \frac{q.L^3}{24E.I}$
 $R_A = \frac{qL}{6} \quad R_B = \frac{qL}{3}$ Charge à répartition variable	 $V_A = -R_A \quad V_B = R_B$ $V_0 = 0$ pour $x = \frac{L}{\sqrt{3}}$	 $M(x) = \frac{qLx}{6}\left[1 - \frac{x^2}{L^2}\right]$ $M_0 = \frac{ql^2}{9\sqrt{3}}$ pour $x_0 = \frac{L}{\sqrt{3}}$	Avec $P = \frac{qL}{2}$ $R_A = \frac{P}{3} \quad R_B = \frac{2}{3}P$ $M_0 = \frac{2PL}{9\sqrt{3}}$
 $R_A = q\frac{(L+2a)}{2} \quad R_A = R_B$ Charges uniformément réparties	 $V_{gA} = qA \quad V_{dA} = -\frac{qL}{2}$ $V_{gB} = \frac{qL}{2} \quad V_{dB} = -qA$	 $M_0 = \frac{q}{8}(L^2 - 4a^2)$ à mi portée. $M_A = M_B = -q\frac{a^2}{2}$	

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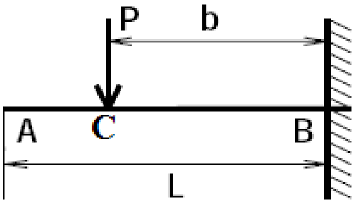
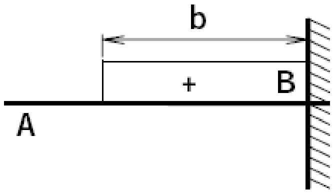
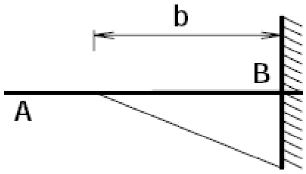
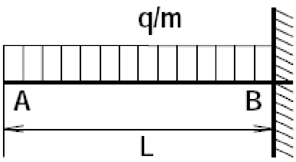
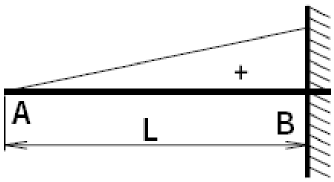
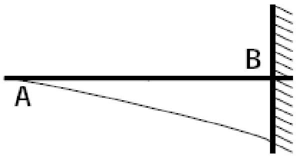
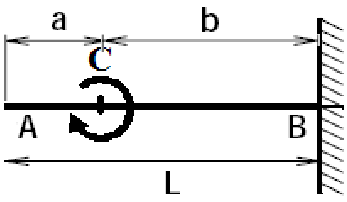
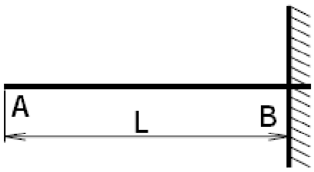
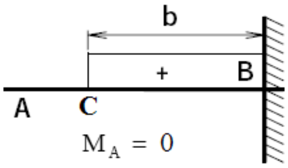
III/ Poutre encastrée à une extrémité, libre à l'autre extrémité.

	Effort tranchant	Moment de flexion	Observations
 $R_B = P.b \quad M_B = -P.b$ Charge concentrée	 $V_A = 0 \quad V_{\overline{CB}} = P$	 $M_B = -Pb$	Flèche en A : $f = \frac{P.b^2}{6E.I}(3L - b)$ Flèche en C : $f = \frac{P.b^3}{3E.I}$ $\theta_A = \theta_C = \frac{P.b^2}{2E.I}$
 $R_B = q.L \quad M_A = -\frac{q.L^2}{2}$ Charge uniformément répartie	 $V_B = qL$ $V(x) = px$	 $M_B = -\frac{qL^2}{2}$ $M(x) = -q\frac{x^2}{2}$	Flèche en A : $f = \frac{qL^4}{8EI}$ $\theta_A = \frac{q.L^3}{6E.I}$
 Moment de flexion Mf	 $V(x) = 0$	 $M_A = 0$ $M_{\overline{CB}} = Mf$	Flèche en A : $f = \frac{Mf.b}{E.I}(L - \frac{b}{2})$ Flèche en C : $f = \frac{Mf.b^2}{2E.I}$ Rotations : $\theta_A = \theta_B = \frac{Mf.b}{E.I}$