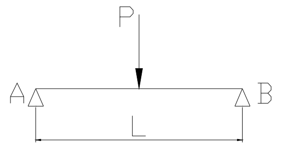
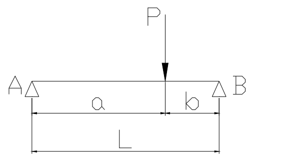
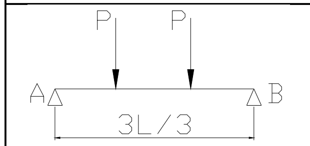
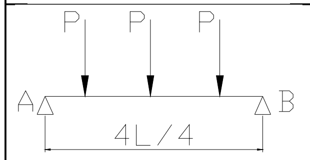
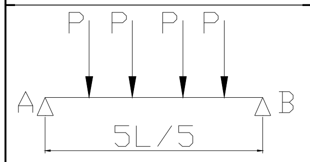
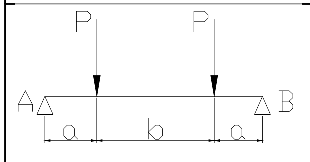
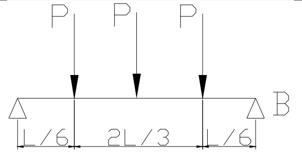
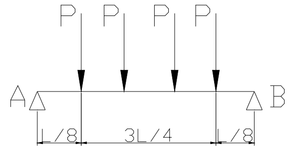
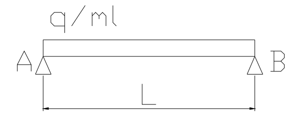
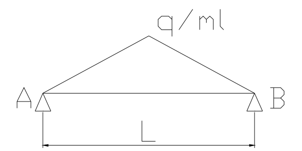
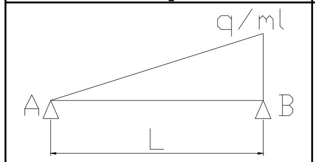
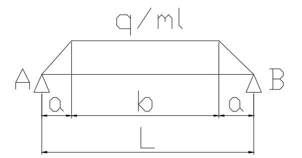
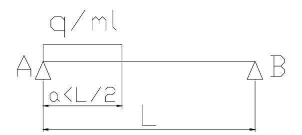
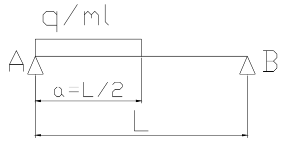
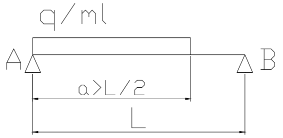
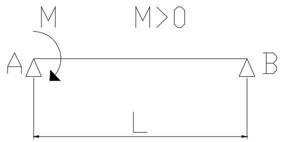
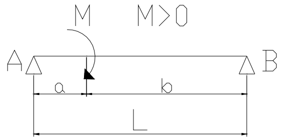
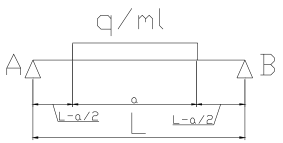
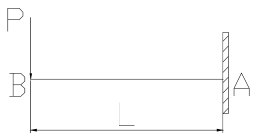
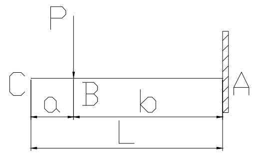
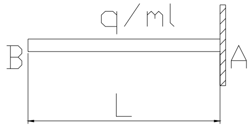
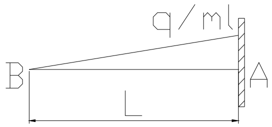
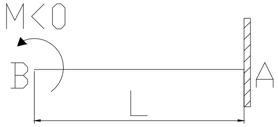
FORMULAIRE DES POUTRES

Cas de charges	Réactions aux appuis	Moment maximum	flèche L en m H en mm σ en DaN/mm²	Flèche à l/2	Rotation aux appuis
	$\frac{P}{2}$	$M_{L/2}=\frac{PL}{4}$	$0.79\frac{\sigma L^2}{h}$	$\frac{PL^3}{48EI}$	$\theta_A=-\frac{PL^2}{16EI}$ $\theta_B=+\frac{PL^2}{16EI}$
	$R_A=\frac{Pb}{L}$ $R_B=\frac{Pa}{L}$	$M_0=M_a=\frac{Pab}{L}$ $M_{L/2}=\frac{Pb}{2}$ (a>b)		$f_{l/2}=\frac{-Pb}{48EI}\left(3L^2-4b^2\right)$ $f_a=\frac{-Pa^2b^2}{3EIL}$ $f_{max}=\frac{-Pb}{27EIL}\sqrt{3\left(L^2-b^2\right)^3}$	$\theta_A=\frac{Pb}{6EIL}\left(b^2-L^2\right)$ $\theta_B=\frac{Pa}{6EIL}\left(L^2-a^2\right)$
	P	$M_{L/2}=\frac{PL}{3}$	$1.01\frac{\sigma L^2}{h}$	$\frac{23PL^3}{648EI}$	
	$\frac{3P}{2}$	$M_{L/2}=\frac{PL}{2}$	$0.84\frac{\sigma L^2}{h}$	$\frac{19PL^3}{384EI}$	
	$2P$	$M_{L/2}=\frac{3PL}{5}$	$1.0\frac{\sigma L^2}{h}$	$\frac{63PL^3}{1000EI}$	
	P	$M_{L/2}=Pa$	$\frac{\sigma L^2}{h}$	$\frac{Pa(3L^2-4a^2)}{24EI}$	

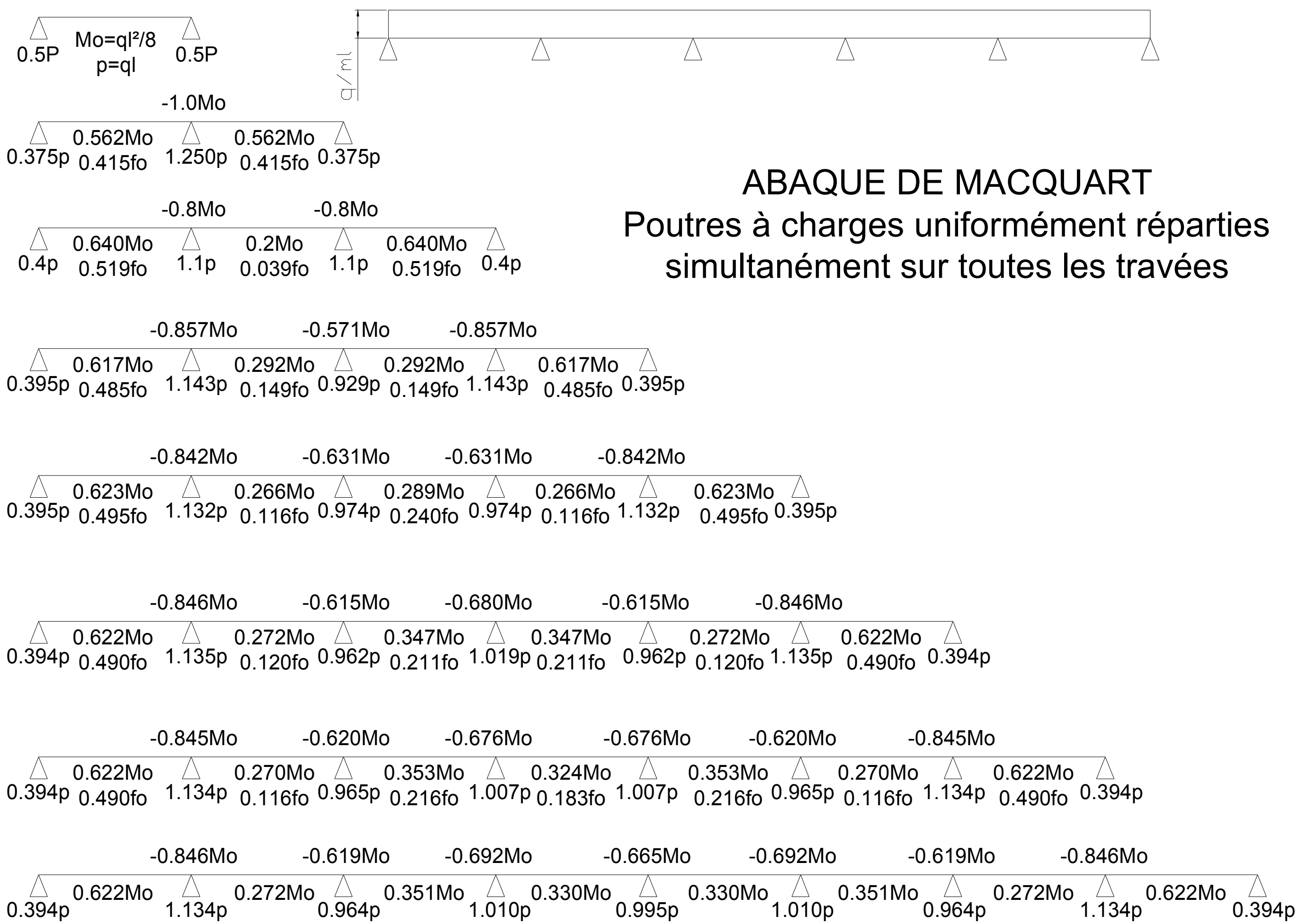
	$\frac{3P}{2}$	$M_{L/2} = \frac{5PL}{12}$	$0.94\frac{\sigma L^2}{h}$	$\frac{53PL^3}{1296EI}$	
	$2P$	$M_{L/2} = \frac{PL}{2}$	$0.94\frac{\sigma L^2}{h}$	$\frac{41PL^3}{768EI}$	
	$\frac{qL}{2}$	$\frac{qL^2}{8}$	$0.99\frac{\sigma L^2}{h}$	$\frac{5qL^4}{384EI}$	$\theta_A = -\frac{qL^3}{24EI}$ $\theta_B = +\frac{qL^3}{24EI}$
	$\frac{qL}{4}$	$\frac{qL^2}{12}$	$0.95\frac{\sigma L^2}{h}$	$\frac{qL^4}{120EI}$	$\theta_A = -\frac{5qL^3}{192EI}$ $\theta_B = +\frac{5qL^3}{192EI}$
Cas de charges multiples			$\approx \frac{\sigma L^2}{h}$		
	$R_A = \frac{qL}{6}$ $R_B = \frac{qL}{3}$	$M_0 = \frac{qL^2\sqrt{3}}{27}$ $M_{L/2} = \frac{qL^2}{16}$		$f_{L/2} = -\frac{5qL^4}{768EI}$ $f_{max} = -\frac{5qL^4}{765EI}$	$\theta_A = -\frac{7qL^3}{360EI}$ $\theta_B = +\frac{8qL^3}{360EI}$
	$R_A = \frac{q}{2}(a+b)$ $R_B = \frac{q}{2}(a+b)$	$M_0 = M_{L/2} = \frac{q}{24}(3L^2 - 4a^2)$		$f_{max} = f_{L/2} = -\frac{q}{EI}\left(\frac{a^2L^2}{48} + \frac{a^4}{120} - \frac{5L^4}{384}\right)$	$\theta_A = +\frac{q}{24EI}(2a^2L - a^3 - L^3)$ $\theta_B = +\frac{q}{24EI}(L^3 + a^3 - 2a^2L)$
	$R_A = \frac{qa}{L}\left(L - \frac{a}{2}\right)$	$M_x{}_0^{L/2} = R_A x - \frac{qx^2}{2}$		$f_{L/2} = -\frac{qa^2}{96EI}(2a^2 - 3L^2)$	

	$R_B=\frac{qa^2}{2L}$	$M_x\,{}^{L}_{L/2}=R_A x-\frac{qa}{2}\left(x-\frac{a}{2}\right)$		$f_{L/2}=-\frac{5qL^4}{768EI}$	
				$f_{L/2}=-\frac{q}{48EI}\left[\frac{L^4}{16}+\left(a(2L-a)-\frac{L^2}{4}\right)^2\right]$	
	$R_A=\frac{-M}{L}$ $R_A=\frac{+M}{L}$	$M_0=M_A=M$ $M_B=0$		$f_{L/2}=-\frac{ML^2}{16EI}$ $f_{maxi}=-\frac{ML^2}{15.58EI}$	$\theta_A=-\frac{ML}{3EI}$ $\theta_B=+\frac{ML}{6EI}$
	$R_A=\frac{-M}{L}$ $R_A=\frac{+M}{L}$	$M_{aw}=-\frac{Ma}{L}$ $M_{ae}=+\frac{Mb}{L}$		$f_a=+\frac{Mab}{3EIL}(a-b)$ $f_{L/2}=+\frac{M}{16EI}\left(4a^2-L^2\right)$	$\theta_A=+\frac{M}{EI}\left(a-\frac{L}{3}-\frac{a^2}{2L}\right)$ $\theta_B=-\frac{M}{EI}\left(\frac{L}{6}-\frac{a^2}{2L}\right)$
	$R_A=R_B=\frac{Pa}{2}$	$M_m=+\frac{Pa}{8}(2L-a)$		$f_{L/2}=\frac{Pa}{384EI}\left(8L^3-4a^2L+a^3\right)$	
	$R_A=P$	$M_A=-PL$		$f_B=-\frac{PL^3}{3EI}$	$\theta_B=+\frac{PL^2}{2EI}$
	$R_A=P$	$M_A=-Pb$		$f_B=-\frac{Pb^3}{3EI}$ $f_C=-\frac{Pb^2}{6EI}(2L+a)$	$\theta_B=\theta_c=+\frac{Pb^2}{2EI}$

	$R_A = qL$	$M_A = -\dfrac{qL^2}{2}$		$f_B = -\dfrac{qL^4}{8EI}$	$\theta_B = +\dfrac{qL^3}{6EI}$
	$R_A = \dfrac{qL}{2}$	$M_A = -\dfrac{qL^2}{6}$		$f_B = -\dfrac{qL^4}{30EI}$	$\theta_B = +\dfrac{qL^3}{34EI}$
	$R_A = 0$	$M_A = M$		$f_B = -\dfrac{ML^2}{2EI}$	$\theta_B = \dfrac{ML}{EI}$

ABAQUE DE MACQUART

ABAQUE DE MACQUART
Poutres à charges uniformément réparties
simultanément sur toutes les travées



dans cette abaque on calcule le moment maximum Mo, les réactions et la flèche maximum de la travée simple considérée comme isostatique, puis on applique les coefficients donnés ci-dessus pour trouver les différents moments, flèches et réactions des poutres hyperstatiques

<u>nota :</u> le chargement est considéré comme une CUR uniformément répartie sur toute la longueur.