

Wzór Maxwella - Mohra

Wpływ sił wewnętrznych

$$u_w = \int \frac{M_p \bar{M}}{EI} dx + \kappa \int \frac{Q_p \bar{Q}}{GA} dx + \int \frac{N_p \bar{N}}{EA} dx$$

Wpływ temperatury

$$\Delta T = |T_D - T_G|$$

$$\Delta T_0 = \frac{T_d - T_g}{2} - T_m$$

$$u_t = \frac{\alpha \Delta T}{h} \int \bar{M} dx + \alpha \Delta T_0 \int \bar{N} dx$$

Wpływ podpór sprężystych

$$u_s = R_p \bar{R} f = \frac{R_p \bar{R}}{k}$$

Wpływ osiadania podpór

$$u_o = \bar{R} \Delta$$

Całkowite przemieszczenie

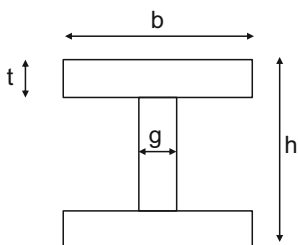
$$u = u_w + u_t + u_s + u_o$$

Uwaga

Współczynnik κ - współczynnik ścinania

Prostokąt $\kappa = 1.2$

Dwuteownik $\kappa = \frac{A}{A_{\text{środnika}}} = \frac{A}{g(h - 2t)}$

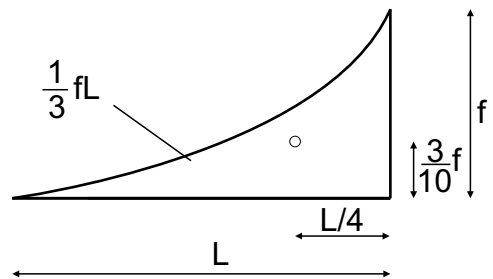
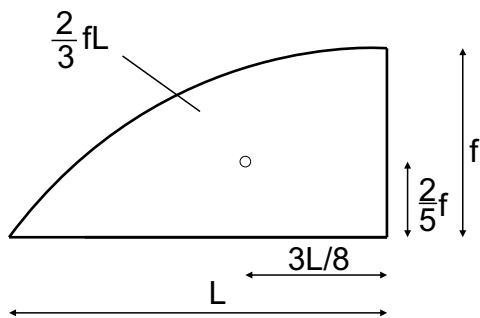
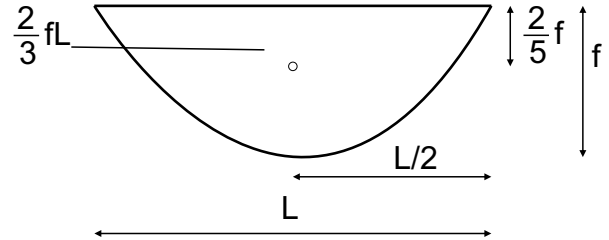
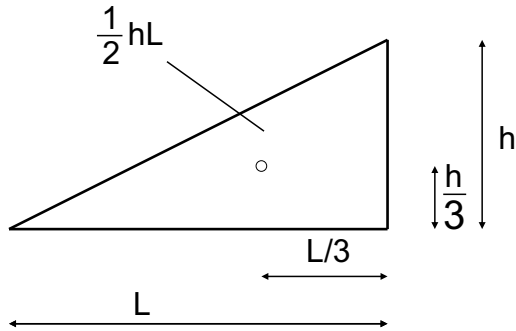


Uwaga - przypomnienie z wytrzymałości materiałów

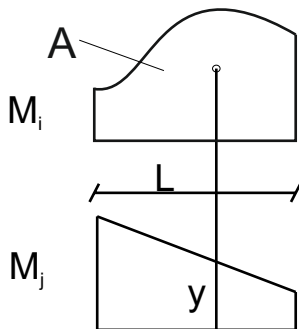
Praca momentu zginającego

$$L = \frac{1}{2} \int \frac{M_g^2}{EI} dx$$

Pola powierzchni oraz położenia środków ciężkości



Przykłady obliczania całek graficznych wzorem Wereszczagina

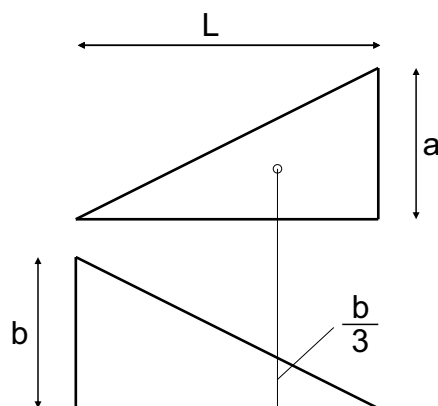


A - powierzchnia ograniczona dowolną ciągłą krzywą

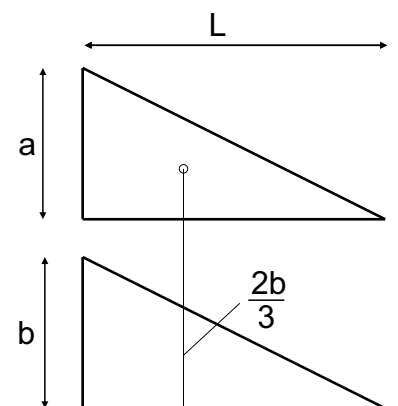
S - środek ciężkości powierzchni A

y - rzędna funkcji liniowej znajdująca się pod środkiem ciężkości powierzchni A

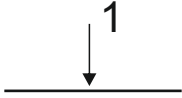
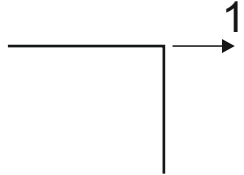
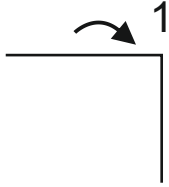
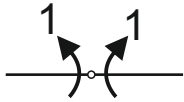
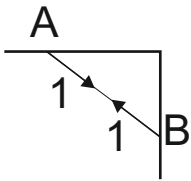
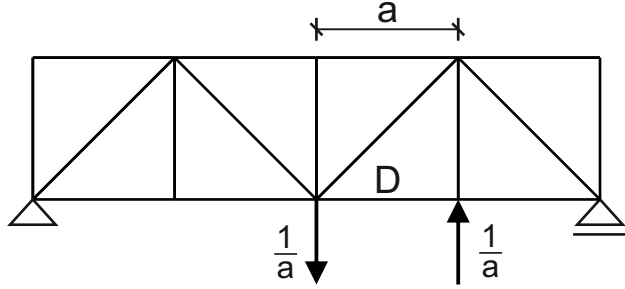
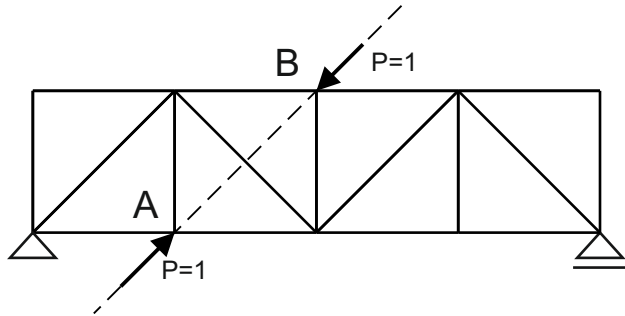
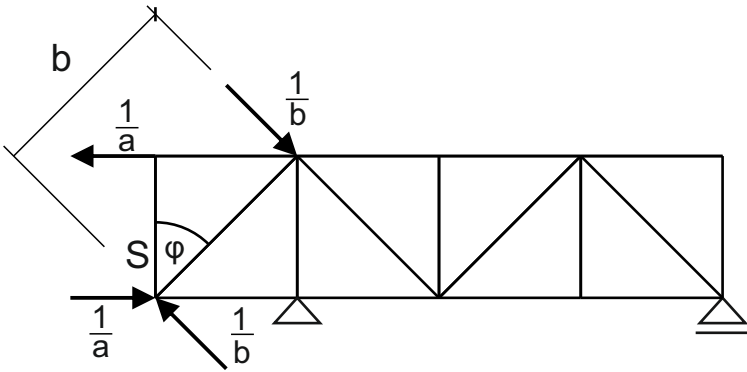
$$\int M_i M_j dx = Ay$$

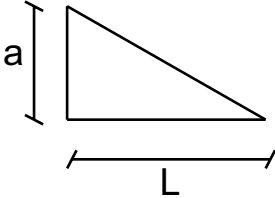
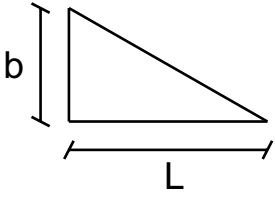
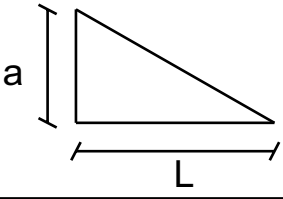
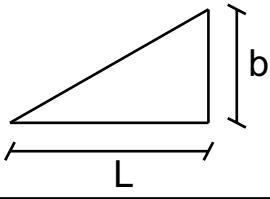
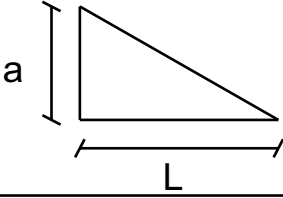
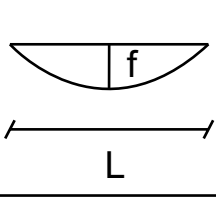
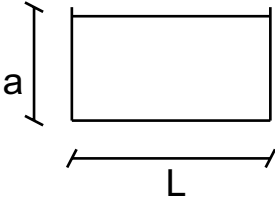
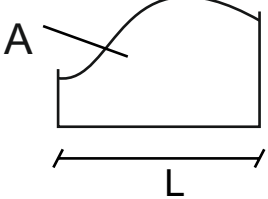
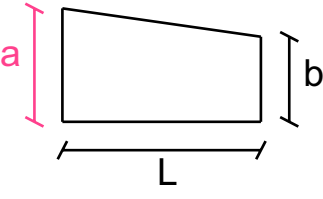
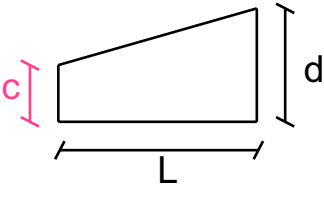
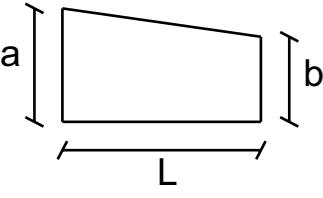
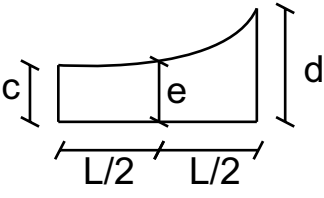
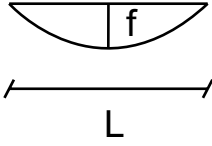
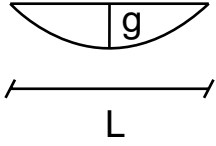


$$\frac{aL}{2} \frac{b}{3} = \frac{1}{6} abL$$



$$\frac{aL}{2} \frac{2b}{3} = \frac{1}{3} abL$$

Przemieszczenie pionowe		Przemieszczenie poziome	
Kąt obrotu		Wzajemny kąt obrotu	
Wzajemne przemieszczenie AB			
Kąt obrotu pręta			
Zmiana odległości między punktami			
Zmiana kąta obrotu między punktami			

M_i	M_j	$\int M_i M_j dx$
		$\frac{1}{3} abL$
		$\frac{1}{6} abL$
		$\frac{1}{3} afL$
		Aa
		$\frac{L}{6} (2ac + 2bd + ad + bc)$
		$\frac{L}{6} (a(c + 2e + b(d + 2e)))$
		$\frac{8}{15} fgL$

