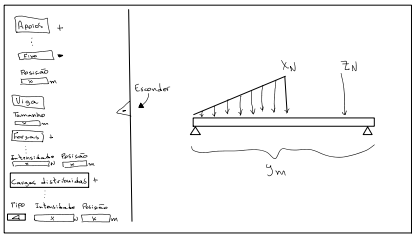
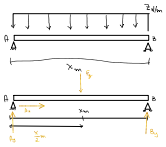
Projeto A3 - mecsol

Monday, 25 April 2022 20:02

Projeto A3 - Mecânica dos Sólidos



Resolução Para carga distribuída retangular



$\boxed{\Sigma F_x = A_x = 0}$

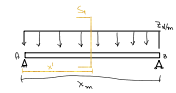
$\Sigma F_y = A_y + B_y = F_y$

$\Sigma M_A = B_y x - F_y \frac{x}{2} = 0$

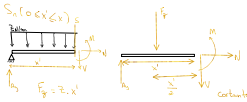
$B_y = F_y \frac{x}{2}$

$\boxed{A_y = F_y \frac{x}{2}}$

$F_y = Z \cdot x$



$S_1 (0 \leq x' \leq x)$



$F_y = Z \cdot x'$

$\boxed{\Sigma F_x = N = 0}$

$\Sigma F_y = V + F_y - A_y = 0$

$V = F_y - A_y = Z x' - \frac{Z x}{2}$

$\boxed{V = Z\left(x' - \frac{x}{2}\right)}$

Intervalo 0 a x

Para $x' = 0$; $V = Z\left(0 - \frac{x}{2}\right) = -\frac{Zx}{2}$

Para $x' = x$; $V = Z\left(x - \frac{x}{2}\right) = \frac{Zx}{2}$

$\Sigma M_s = 0 = M + F_y \frac{x'}{2} - A_y x'$

$M = A_y x' - F_y \frac{x'}{2} \rightarrow \left(\frac{Z x}{2} x'\right) - \left(Z x' \frac{x'}{2}\right)$

$M = \left(\frac{Z x x'}{2}\right) - \left(x'^2 \frac{Z}{2}\right)$

$\boxed{M = A_y x' - \frac{Z}{2} x'^2}$

$M = \frac{Z x}{2} x' - \frac{Z}{2} x'^2$

$\boxed{M = \frac{Z}{2}\left(x x' - x'^2\right)}$

Intervalo $(0 \leq x' \leq x)$

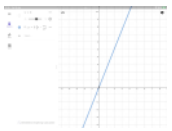
Para $x' = 0$; $M = 0$

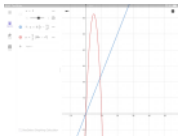
Para $x' = x$; $M = \frac{Z x}{2} x - \frac{Z}{2}(x)^2$

$\boxed{M = \frac{Z x^2}{2} - \frac{Z x^2}{2} = 0}$

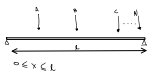
$\frac{dM}{dx'} = V$

cortante positivo próximo então $M \neq 0$





calculo para versão n# (só forças pontuais)



$0 \leq x \leq L$

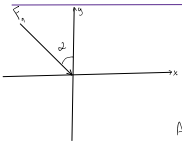
2 apoios fixos (mas duas extremidades)

N forças no intervalo $0 \leq x \leq L$

Pontuais

Força pode ser de compressão ou tração (não tem forças distribuídas)

3 diagramas: normal
cortante
Momento fletor



Reação y dos apoios

$\Sigma F_y = (A_{y_1} + \cdots A_{y_n}) - (F_1 \cos\alpha + \cdots + F_n \cos\alpha) = 0$

Componente y das forças

$\boxed{\text{Reação } y = \text{Componente } y}$

Análogamente, para o eixo x:

$\boxed{\text{Reação } x = \text{Componente } x}$

$\Sigma F_x = (A_{x_1} + \cdots + A_{x_n}) - (F_1 \operatorname{sen}\alpha + \cdots + F_n \operatorname{sen}\alpha) = 0$