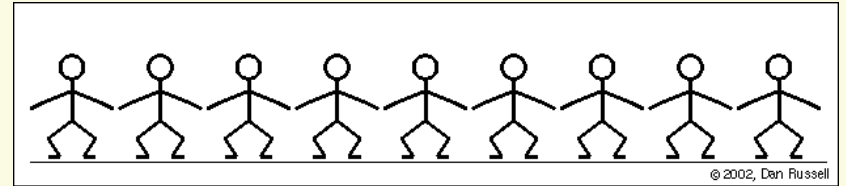


Aula 15: Ondas elásticas

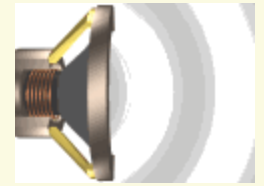
1. Ondas harmónicas
2. Propagação de ondas
3. Velocidade de ondas elásticas



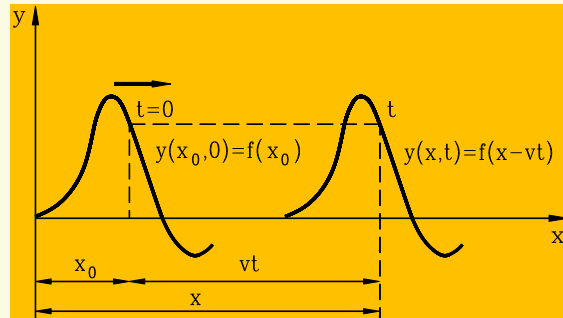
Simulação: perfil de onda (tsunami)

Propagação do MHS: animação

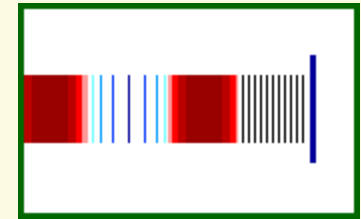
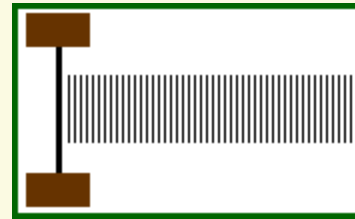
Oscilação e onda: animação

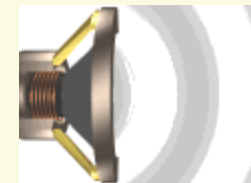


1. Ondas harmónicas



$$\Psi(x, t) = A \sin(kx - \omega t) = A \sin 2\pi \left(\frac{x}{\lambda} \mp \frac{t}{T} \right)$$





2. Propagação de ondas

Intensidade de ondas

$$I = \frac{1}{2} Z \omega^2 A^2$$

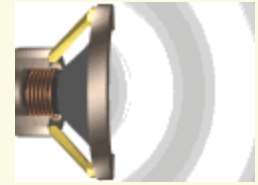
Equação de ondas

$$\frac{\partial^2 \Psi}{\partial t^2} = u^2 \frac{\partial^2 \Psi}{\partial x^2}$$

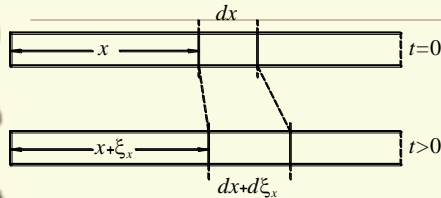
Time (s) : 60

Simulação: propagação do som

Simulação: ondas elásticas numa corda

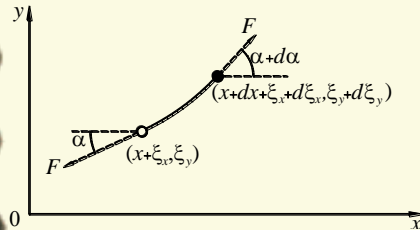


3. Velocidade de ondas elásticas



Ondas longitudinais

$$u = \sqrt{\frac{E}{\rho}}$$



Ondas transversais

$$u = \sqrt{\frac{F}{\rho}}$$

