

Mecânica Computacional Dinâmica das Estruturas

Prof. : Flávio de Souza Barbosa

Física: Mecânica:

Dinâmica x Estática

Sólidos x Fluidos

Modelagem Computacional

Física: Mecânica:

Dinâmica x Estática

Sólidos x Fluidos

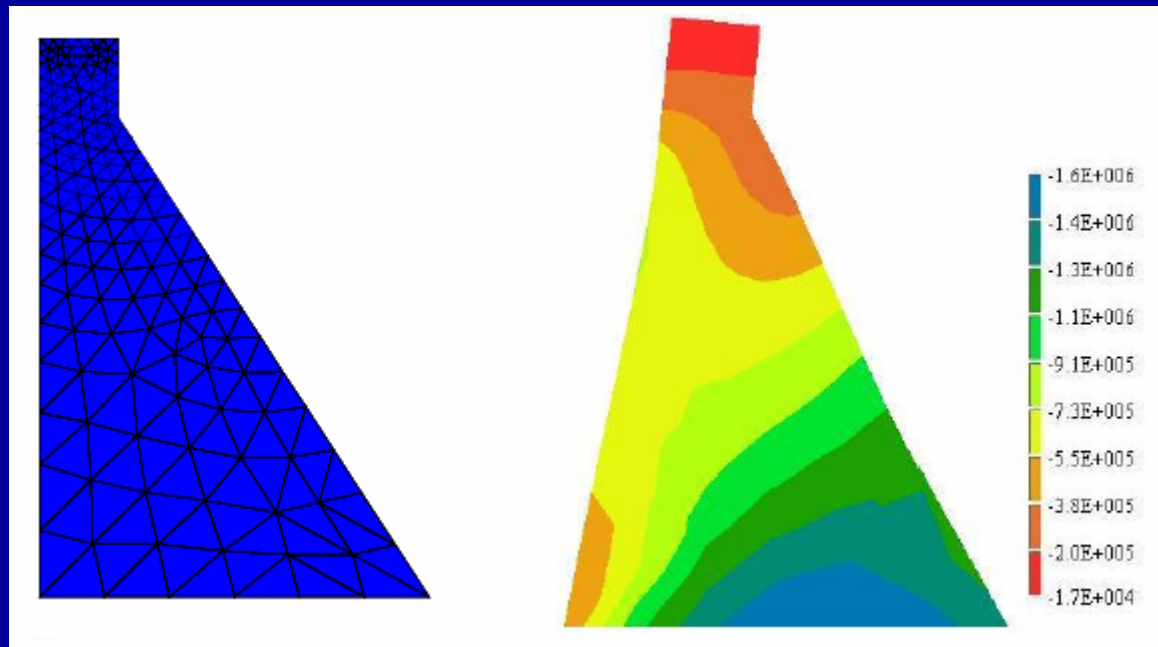
Modelagem Computacional

Mecânica Computacional

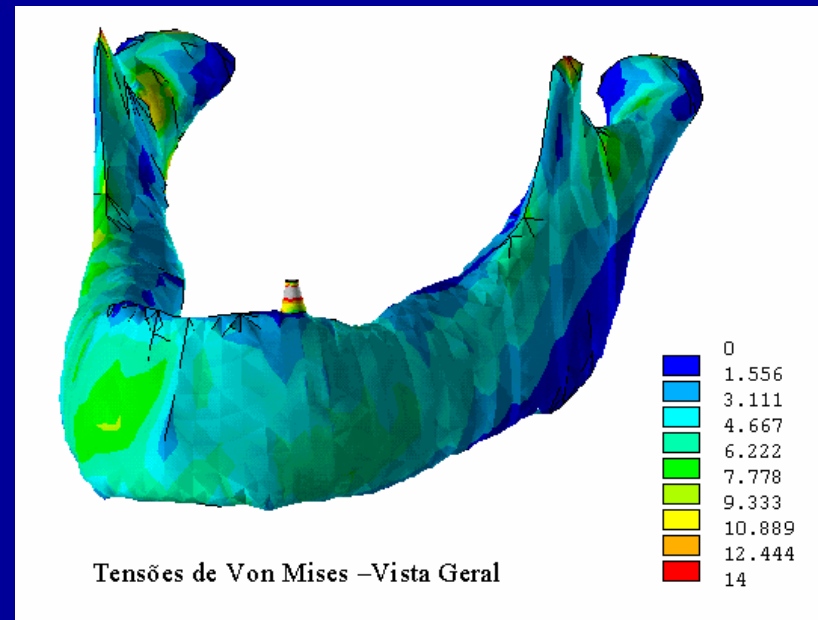
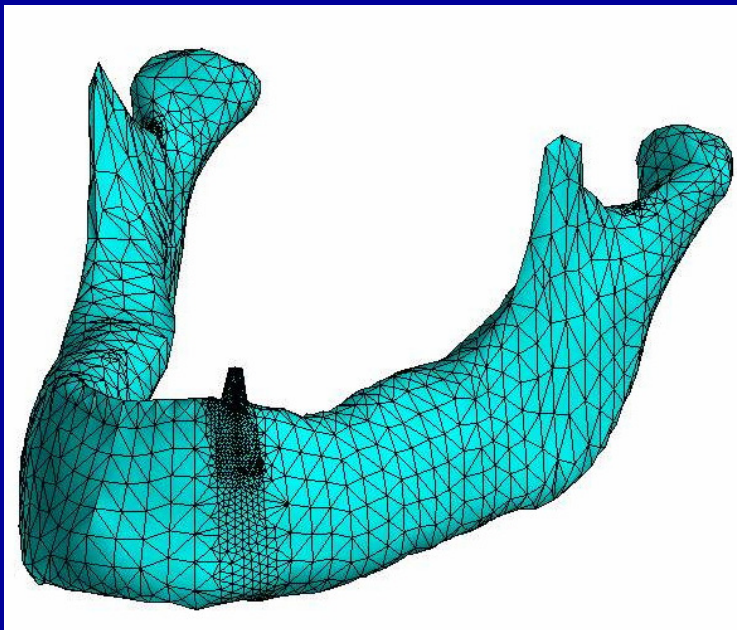
Exemplos:

CFD: Vídeos: <http://www.cfd.com.au/>

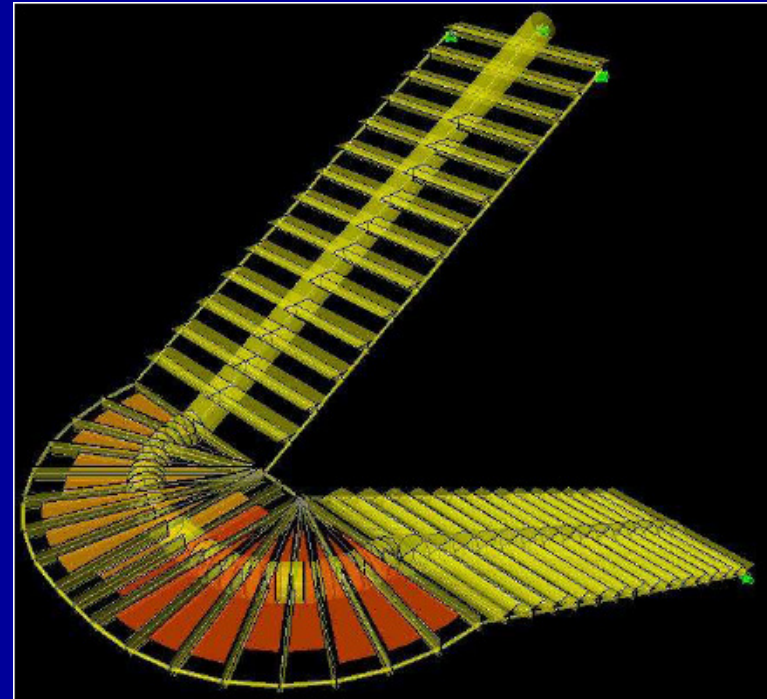
Exemplos (Anna Paula Guida – TFC - UFJF)



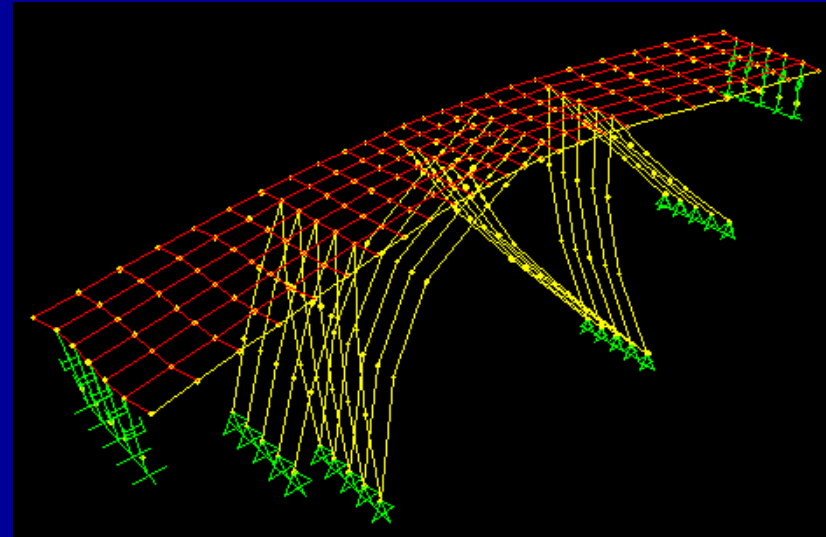
Exemplos: NUMEC - UFJF



Exemplos: NUMEC – UFJF (vídeo)



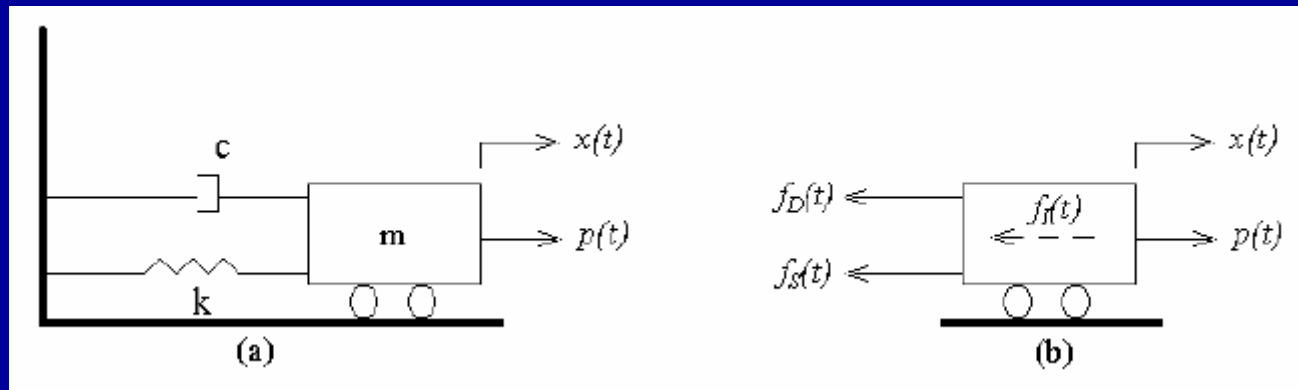
Exemplos: NUMEC – UFJF (vídeos)



Como modelar?

Dinâmica das Estruturas

Física: Equilíbrio



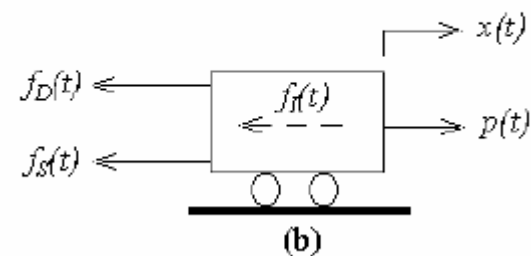
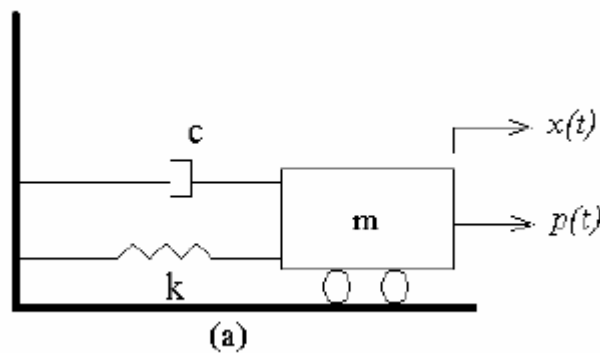
Análise Dinâmica

$$m\ddot{x}(t) + c\dot{x}(t) + kx(t) = p(t)$$

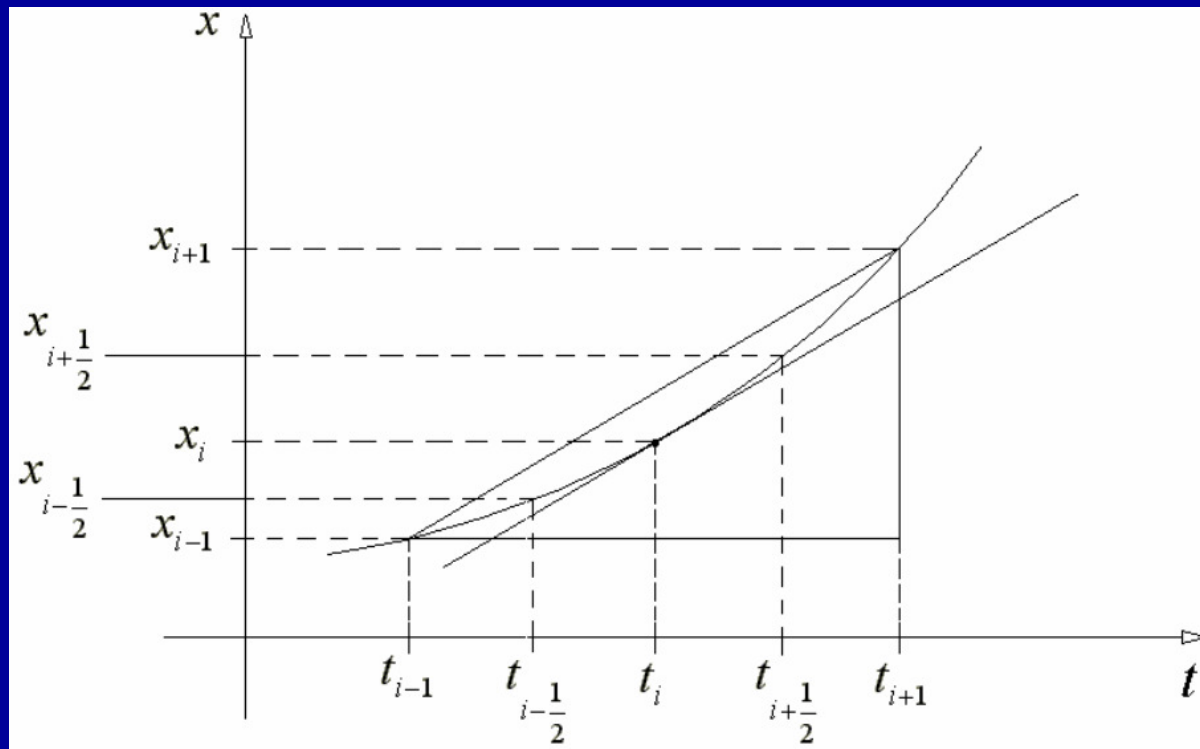
$$f_I(t) = m\ddot{x}(t)$$

$$f_D(t) = c\dot{x}(t)$$

$$f_S(t) = kx(t)$$



Aproximação das derivadas:



$$\dot{X}^i = \frac{X^{i+1} - X^{i-1}}{2\Delta t}$$

$$\ddot{X}^i = \frac{1}{\Delta t^2} (X^{i+1} - 2X^i + X^{i-1})$$

$$m\ddot{x}(t) + c\dot{x}(t) + kx(t) = p(t)$$

$$M \left[\frac{1}{\Delta t^2} (X^{i+1} - 2X^i + X^{i-1}) \right] + C \left(\frac{X^{i+1} - X^{i-1}}{2\Delta t} \right) + K X^i = F^i$$

$$\dot{X}^i = \frac{X^{i+1} - X^{i-1}}{2\Delta t}$$

$$\ddot{X}^i = \frac{1}{\Delta t^2} (X^{i+1} - 2X^i + X^{i-1})$$

MAPLE - MATLAB

Takoma