

Modelagem e Simulação

Verificação do Modelo

Problema



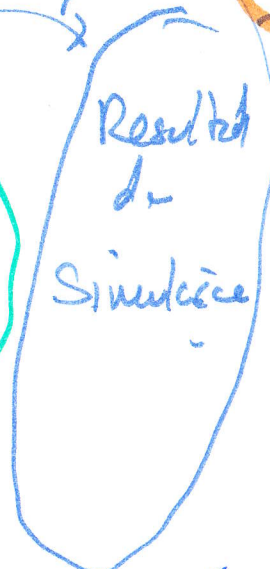
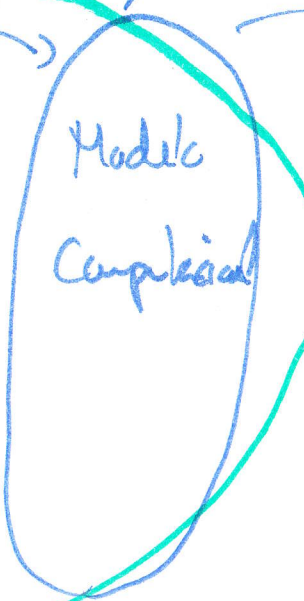
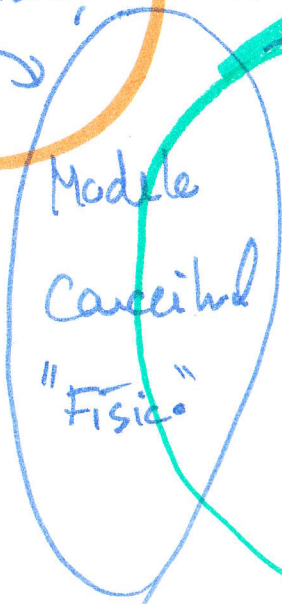
Identificação

Abstração

Implementação

Execução

Interpretação



Divulgação

Fenômeno

Hip. de compatibilidade

Leis Físicas

EDO e algébricas

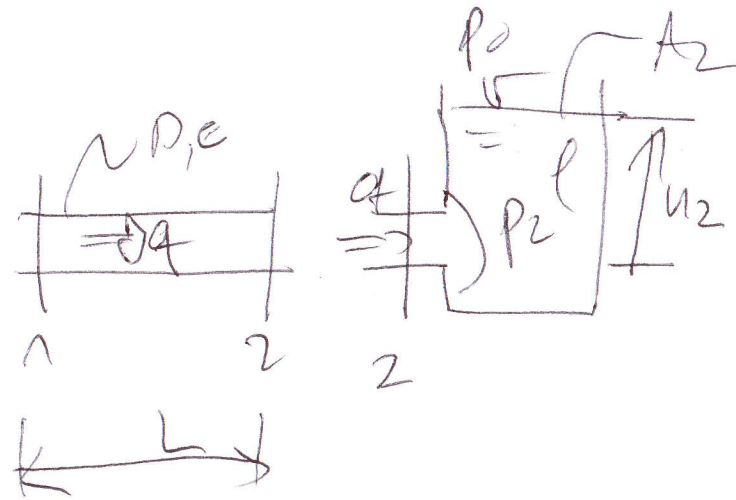
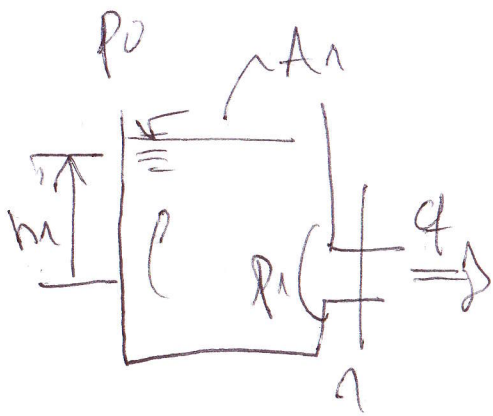
Código

Tabela de Dados

Gráficos no computador

Validação de Modelos.

Solução de Problemas



$$A_1 \frac{dh_1}{dt} = -q$$

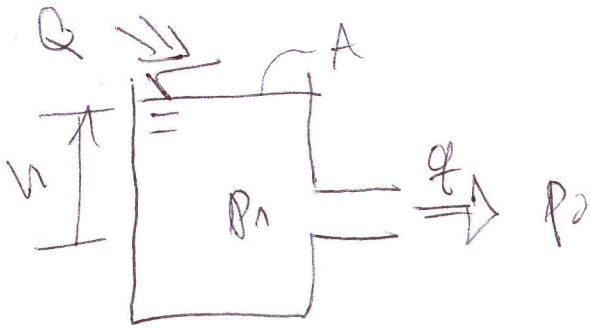
$$A_2 \frac{dh_2}{dt} = q$$

$$p_1 - p_2 = R q^2$$

$$p_1 > p_2 \quad R(R_e)$$

$$p_1 = p_0 + \rho g h_1$$

$$p_2 = p_0 + \rho g h_2$$



$$A \frac{dh}{dt} = q + Q$$

$$A \frac{dh}{dt} = - \sqrt{\frac{\rho g h}{R} + Q}$$

$$p_1 - p_0 = R q^2$$

$$p_1 = p_0 + \rho g h$$

$$\rho g h = R q^2 \Rightarrow q = \sqrt{\frac{\rho g h}{R}}$$

$$\rho g h = R q^2 \Rightarrow \rho g h \approx R q_0 q \Rightarrow q = \frac{\rho g h}{R q_0}$$

$q_0 = \text{vazie medie}$

$$A \frac{dh}{dt} + \frac{\rho g h}{R q_0} h = Q$$

E.V.O. Linearizado

$$h(t) = H_0 e^{-\lambda t} \quad \tau = \frac{1}{\lambda}$$

$$\tau = \frac{A R q_0}{\rho g}$$

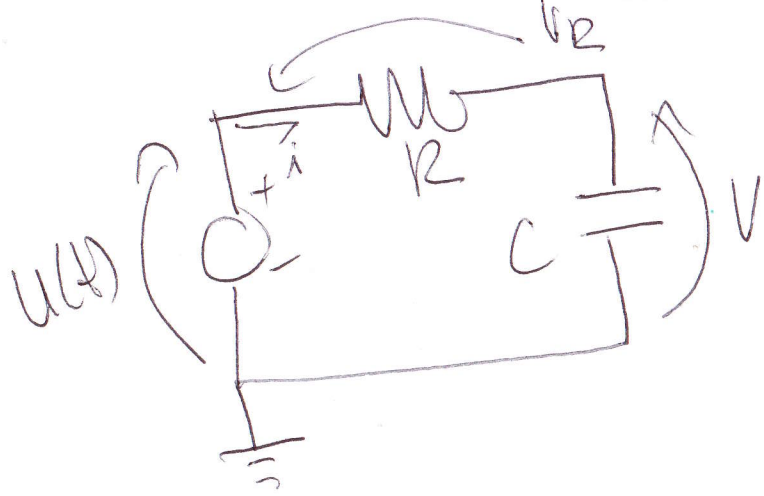
$$RQ: q_0 = Q$$

$$\rho g$$

$$\tau: q_0 = q(0)$$

const de tempo

(3)



$$V_R = R i$$

$$i = C \frac{dV}{dt}$$

$$R i + V = U$$

$$RC \frac{dV}{dt} + V = U$$

$$U = V_R + V$$

$$\tau = RC$$

$$u(t) = \begin{cases} 0 & | t \leq t_0 \\ U_0 & | t > t_0 \end{cases}$$

$$V_u(t) = V_0 e^{-t/\tau}$$

$$V_p(t) = K$$

Exc. Diagram

