João Vinícius H. de Lara 10771740 Exercícios aula 24/...

1) Demonstramos que

$$\dot{m} = (C_\forall + C_c)\frac{dP_2}{dt}$$

onde $C_\forall = \rho \frac{d\forall}{dP_2}$ e $C_c = \frac{\forall M}{\bar{R}T}$

Para o fole $\forall = Ax$, então

$$C_c = \frac{AM}{\bar{R}T}x$$

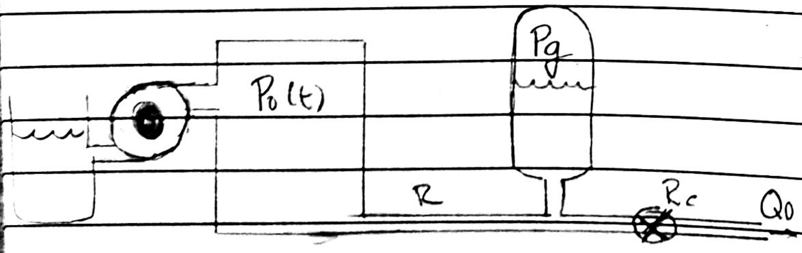
Temos, nesse caso, $\forall = 2\,m^2$, $T = 50°C = 323{,}15\,K$ e $\bar{R}/M = 287\ Nm/kgK$, donde

$$C_c = \frac{\forall M}{\bar{R}T} = \frac{2}{287 \cdot 323{,}15}$$

$$C_c = 2{,}16 \times 10^{-5}\ ms^2$$

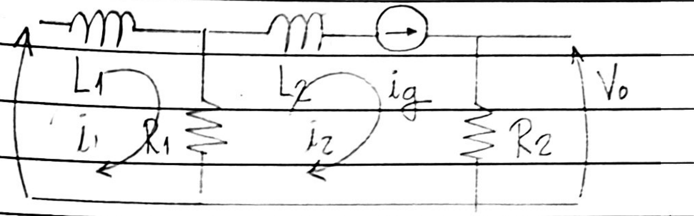
2) Hipóteses:

- reg. permanente
- líq. incompressível
- sist. adiabático
- reg. turbulento
- tubos de pequeno comprimento




Trataremos o ar como gás ideal mantido à pressão $P_g$ constante.

a) $E1 \begin{cases} Q \to V \\ P \to i \end{cases}$ $R \longrightarrow 1/\rho g R_f$; $L \longrightarrow A/\rho g$




Malha 1

$$L_1 D i_1 + R_1(i_1 - i_2) = 0$$

$$(L_1 D + R_1) i_1 = R_1 i_2$$

$$\therefore \left(\frac{A_1 D}{\rho g} + \frac{1}{\rho g R_f}\right) P_0 = \frac{1}{\rho g R} P_g$$

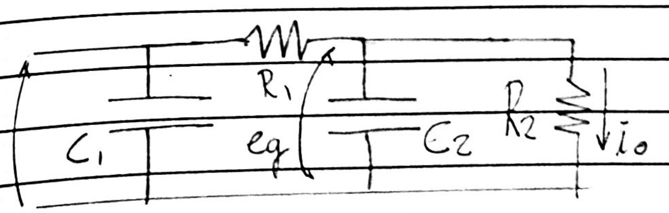
Malha 2

$$L_2 D i_2 + R_2 i_2 + R_1(i_2 - i_1) = 0$$

$$\therefore \left(\frac{A_2 D}{\rho g} + \frac{1}{\rho g R_c} + \frac{1}{\rho g R}\right) P_g = \frac{P_0}{\rho g R}$$

Mas $V_0 = R_2 i_g \to Q_0(t) = \frac{P_g}{\rho g R_c}$

b) $E2 \begin{cases} P \to V \\ Q \to i \end{cases}$ $R \longrightarrow \rho g R_f$; $C \longrightarrow A/\rho g$




Nó 1

$$V_1(C_1 D + 1/R_1) - V_2/R_1 = 0$$

$$P_0(A_1 D/\rho g + 1/\rho g R) = P_g/\rho g R$$

Nó 2

$$V_2(C_2 D + 1/R_2 + 1/R_1) - V_1/R_1 = 0$$

$$P_g\left(\frac{A_2 D}{\rho g} + \frac{1}{\rho g R_c} + \frac{1}{\rho g R}\right) = \frac{P_0}{\rho g R};\quad \boxed{P_g = \rho g R_c (\ldots)}$$