# DM de SI, PCSI, MPSI, mai 25

## Exo 1

$$H_{BO} = \frac{1,7C}{p(1+0,03p)}$$

$$H_{BF} = \frac{1,7C}{p(1+0,03p)+1,7C} = \frac{1}{\frac{0,03}{1,7C}p^2 + \frac{p}{1,7C} + 1}$$

$$K = 1 \quad ; \quad \omega_n = \sqrt{\frac{1,7C}{0,03}} = 7,53\sqrt{C}$$

$$\frac{2z}{\omega_n} = \frac{1}{1,7C} \Rightarrow z = \frac{1}{2\sqrt{0,03 \times 1,7C}} = \frac{2,2}{\sqrt{C}}$$

$$z = 1 \Rightarrow C = (2,2)^2 = 4,8$$

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## Exo 2

① Contrôleur électronique

② Servo distributeur ③ Vérin ④ Structure articulée

⑤ Volant ⑥ Centrale inertielle

(Q2) $$\varepsilon = \underbrace{\frac{2BSV}{V_0 p}}_{H_1}\left(Q - \underbrace{Se}_{H_6}\Omega_B\right)$$

$$\Omega_B = \underbrace{\frac{1}{I_g p}}_{H_2}\left(\varepsilon + \underbrace{G_3\omega_m}_{-H_3}\Omega_d\right)$$

$$\alpha(p) = \underbrace{\frac{1}{Ie\,p^2 + fe\,p + he}}_{H_6 H_5}\left[C_m - \underbrace{G_3\omega_m}_{-H_3}\Omega_B\right]$$

$\longrightarrow$ avec $H_5 = \frac{1}{p}$ et $H_6 = \frac{1}{\ldots}$

(Q3)

2ème ordre $H(p) = \dfrac{K}{\frac{p^2}{\omega_n^2} + \frac{2\xi}{\omega_n} p + 1}$

$e(\infty) = 1$
$s(\infty) = 1,75$
$\Rightarrow K = 1,75$

$1,05\ s(\infty) = 1,8375$
$0,95\ s(\infty) = 1,6625$
tube $\Rightarrow t_{5\%} = 20\ s$

$s_{max} = 3,1$
$s(\infty) = 1,75$
$\Rightarrow D = 1,35$

$1,75 \rightarrow 100$
$1,35 \rightarrow$

$D\% = \dfrac{1,35}{1,75}$

$D\% = 77\ \%$

Abaque 2 $\Rightarrow$ Amortissement $\xi = 0,1$

Abaque 1 $\Rightarrow t_{5\%}\,\omega_0 = 30$

$\omega_0 = \dfrac{30}{t_{5\%}} = \dfrac{30}{20} = 1,5$