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①

$$G_1(N) = \frac{N^2 + 5N + 2N}{N(N^3 + 7,4N^2 + 76N + 320)}$$

$$G_1(\gamma\omega) = \frac{25(1 - \frac{\omega}{N} + \frac{\omega}{N}\gamma)}{5,64 \cdot 5 \cdot N(\frac{\omega\gamma}{5} + 1)(1 - \frac{\omega^2}{8^2} + 0,0375\omega\gamma)}$$

Constante de bode:

$$\frac{25}{5,64} = \frac{5}{64} \Rightarrow 20 \log\left(\frac{5}{64}\right) = -22,14 \text{ dB}$$

$$\omega_m = 5 \text{ rad/N}$$

$$f = \omega_m / 25 = 0,2$$

$$\omega_{n2} = \omega_m \cdot \sqrt{1 - 2\zeta^2} = 3,5 \text{ rad/N}$$

$$m_{n2} = 1/2\zeta \sqrt{1 - \zeta^2} = 1,25 \text{ dB}$$

$1/N$: decaimento de 20 dB por década

$$\omega_m = 8 \text{ rad/N} \text{ com } \zeta = 0,15$$

$$\omega_{n\zeta} = \omega_m \sqrt{1 - 2\zeta^2} = 7,8 \text{ rad/N}$$

$$M_{dB} = 20 \log(2\zeta \sqrt{1 - \zeta^2} - 1) = 10,55 \text{ dB}$$

dB

