

$$(1) G_0(s) = \frac{10}{s(s+1)(\frac{s}{5}+1)}$$

① 最小相位惯性环节 $\omega_1 = 1$, 斜率减小 20dB/dec

最小相位惯性环节 $\omega_2 = 5$, 斜率减小 20dB/dec

最小交接频率 $\omega_{\min} = \omega_1 = 1$

② $D=1$, $20\lg k = 20\lg 10 = 20\text{dB}$, 过 $(1, 20\text{dB})$

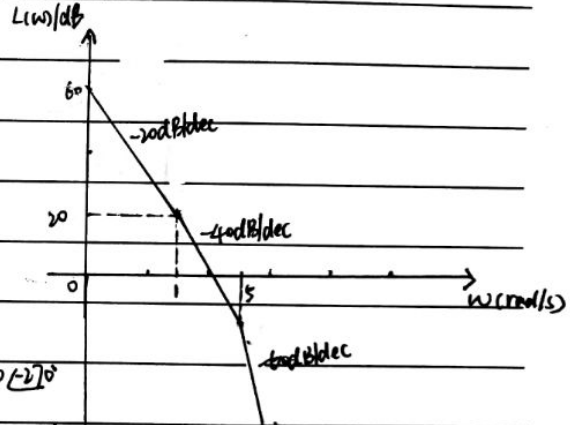
③ $\omega < 1$, $k = -20\text{dB/dec}$

$1 \leq \omega < 5$, $k = -40\text{dB/dec}$

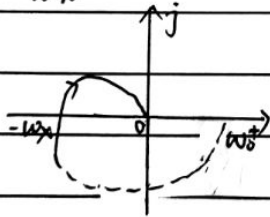
$\omega > 5$, $k = -60\text{dB/dec}$

$$\frac{L(1) - L(\omega_c)}{\lg 1 - \lg \omega_c} = -40$$

$$\omega_c = 3.16 \text{ rad/s}$$



(2) 起: $\lim_{\omega \rightarrow 0^+} G(j\omega) = \infty \angle 90^\circ$ 终: $\lim_{\omega \rightarrow \infty} G(j\omega) = 0 \angle 270^\circ$



$$G_0(j\omega) = \frac{10}{j\omega(j\omega+1)(\frac{j\omega}{5}+1)}$$

$$= \frac{10(\frac{1}{5}\omega + j)(1 - \frac{1}{5}j\omega^2)}{\omega(\omega^2+1)(1 + \frac{1}{5}j\omega)}$$

$$\omega_x = +2.24 \text{ rad/s}$$

$$N = 1, N_+ = 0, P = 0$$

$$Z = P - 2(N_+ - N) = 2$$

不稳定 且有 2 个不稳定的闭环极点

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应计算出开环幅相曲线与负实轴的交点,
确定与-1点的位置关系