

Fall 2021 (110-1)

控制系統
Control Systems

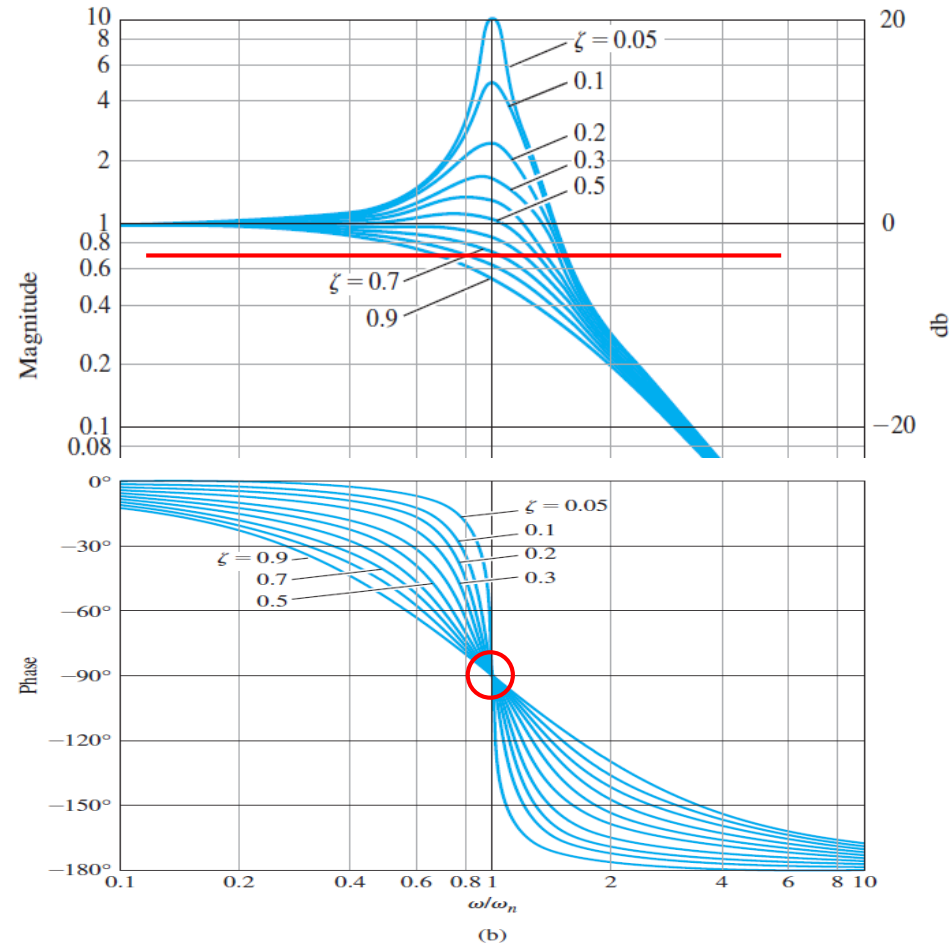
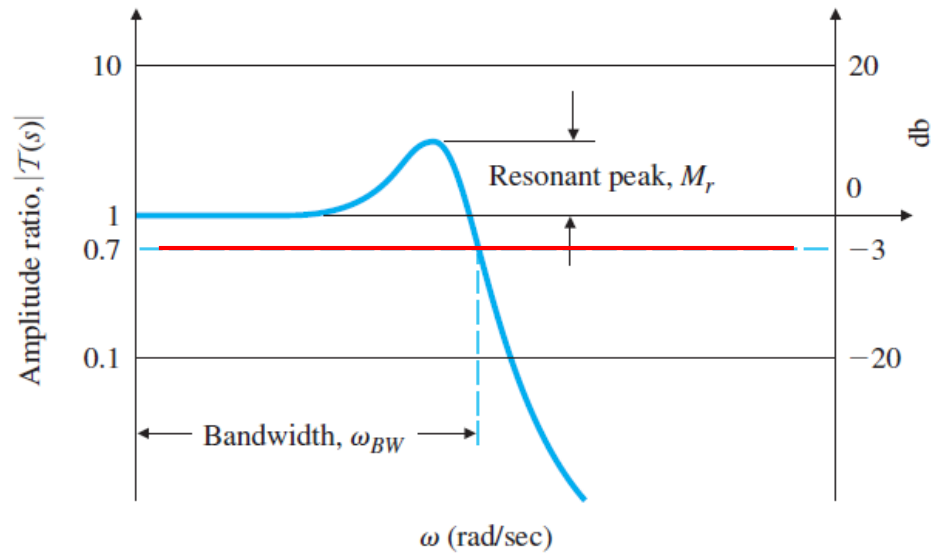
Unit 6H
Closed-Loop Frequency Response

Feng-Li Lian

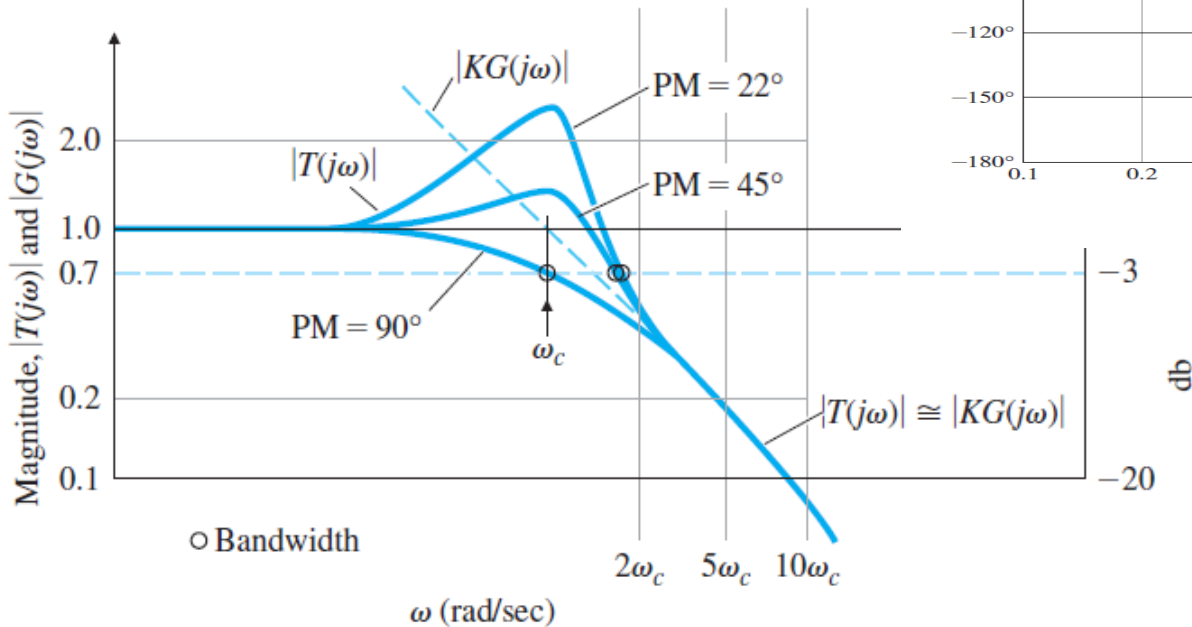
NTU-EE

Sep 2021 – Jan 2022

Closed-Loop Frequency Response - Bandwidth



■ Closed-Loop Bandwidth ω_{BW}



$$|KG(j\omega)|$$

$$|T(j\omega)|$$

PM

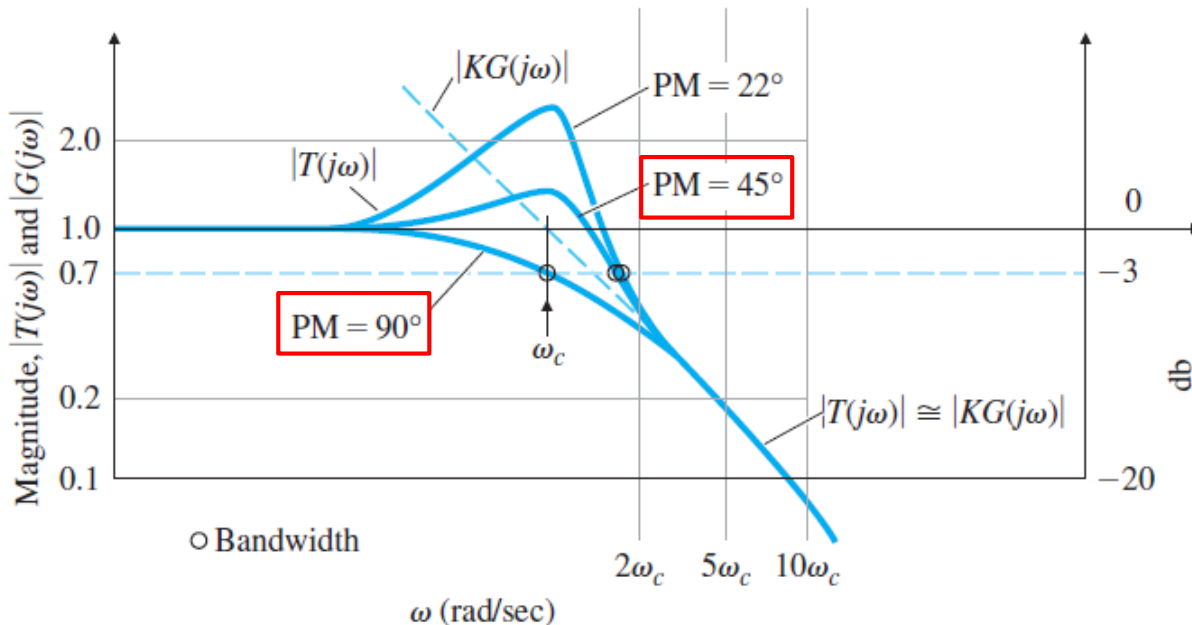
$$|KG(j\omega)| \gg 1 \quad \text{for } \omega \ll \omega_c$$

$$|KG(j\omega)| \ll 1 \quad \text{for } \omega \gg \omega_c$$

$$|T(j\omega)| = \left| \frac{KG(j\omega)}{1 + KG(j\omega)} \right| \approx \begin{cases} 1, & \omega \ll \omega_c \\ |KG|, & \omega \gg \omega_c \end{cases}$$

near ω_c $|KG(j\omega)| = 1$

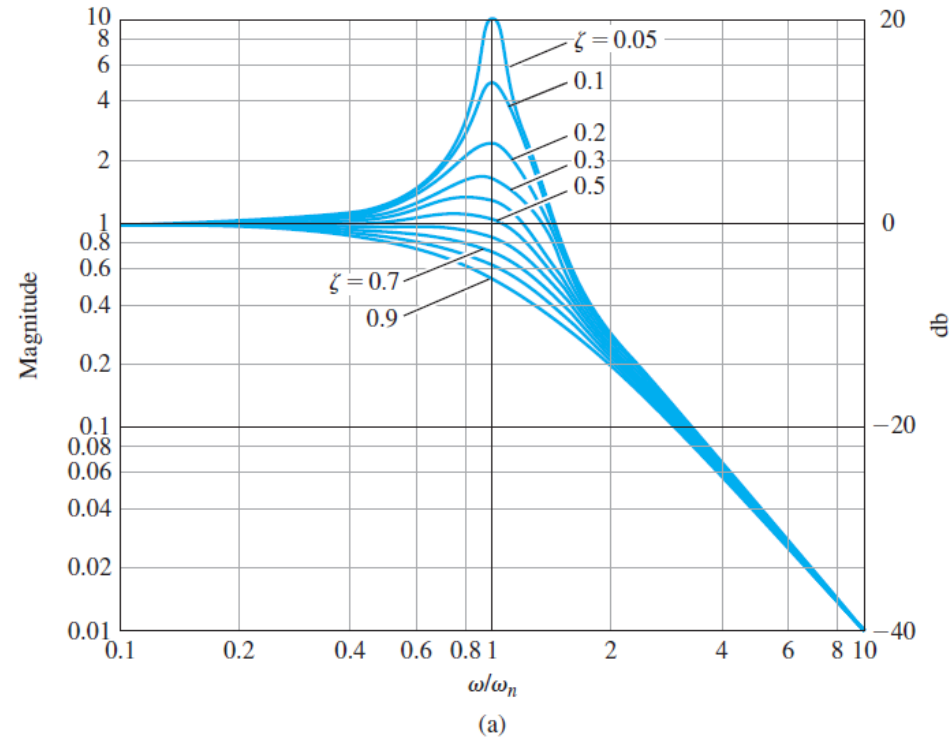
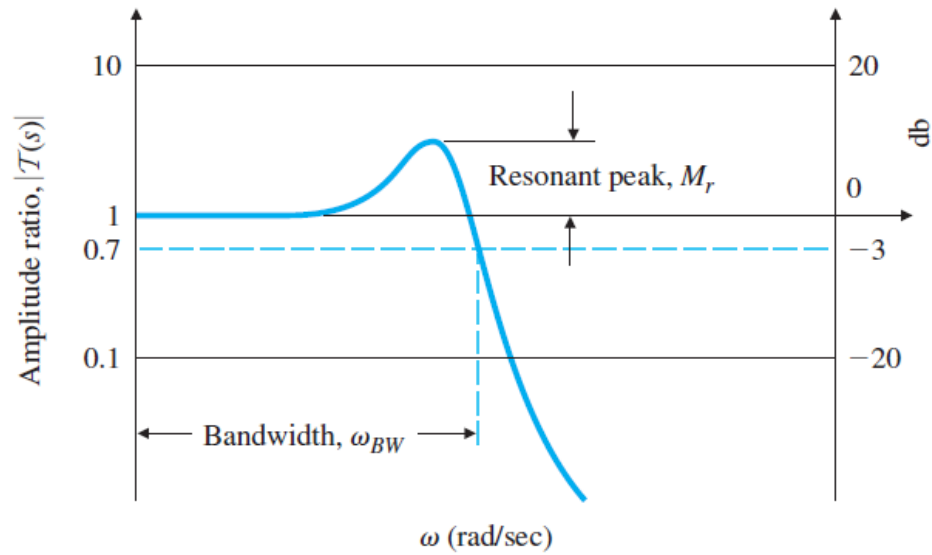
$|T(j\omega)|$ depends heavily on the **PM**



$$|T(j\omega_c)| = 1.31$$

$$|T(j\omega_c)| = 0.707$$

$$\Rightarrow \omega_c \leq \omega_{BW} \leq 2\omega_c$$



Resonant-Peak Magnitude M_r

