선형제어특론(Linear Control System)

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1. Answer the following questions:

(1) Plot the Bode Diagram of $G(s)=\dfrac{1}{s^2+0.4s+1}$

(2) What is gain crossover frequency, phase crossover frequency and bandwidth of the above plant?

2. Answer the following questions

The system is given as follows:

$$\dot{x}(t)=\begin{bmatrix}0 & 1\\ -1 & -0.4\end{bmatrix}x(t)+\begin{bmatrix}1\\ 0\end{bmatrix}u(t)$$

$$y(t)=\begin{bmatrix}1 & 0\end{bmatrix}x(t)$$

(1) Calculate the system pole location and damping ratio.

(2) Calculate the maximum overshoot using the result of (1)
($M_p=e^{-\pi\zeta/\sqrt{1-\zeta^2}}$)

(3) Determine the gain of the state feedback controller to satisfy that the pole of system with state feedback controller becomes -5+5i and -5-5i. (i=$\sqrt{-1}$)

(4) Calculate the maximum overshoot when you use state feedback controller.

(5) Determine the gain of the state observer to satisfy that the pole of state observer becomes -20 and -30.

(6) Draw the block diagram including plant, state feedback controller and state observer.