National Taiwan University

Department of Engineering Science and Ocean Engineering

2019 Winter Semester

Homework 6

Chap 10 Frequency Response Techniques

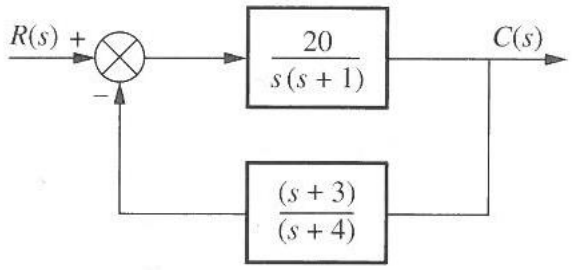
1. Chap 10 Prob. 1 (c)

1. For each of the following $G(s)$, find analytical expressions for the magnitude and phase response. [Section: 10.1]

c. $G(s) = \dfrac{(s+2)(s+4)}{s(s+1)(s+3)}$

2. Chap 10 Prob. 4 System 3

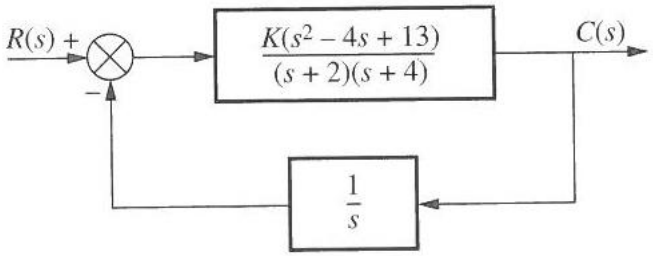
4. Sketch the Nyquist diagram for each of the systems in Figure P10.1. [Section: 10.4]



System 3

3. Chap 10 Prob. 8 System 2 and Prob. 9 (b) for Prob. 8 System 2

8. Using the Nyquist criterion, find the range of K for stability for each of the systems in Figure P10.4. [Section: 10.3]



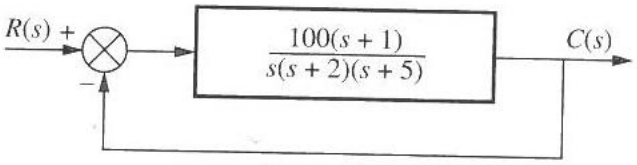
System 2

9. Find the gain margin and the phase margin for each one of the systems of Problem 8 assuming that in each part: [Section: 10.6]

b. $K = 50$

4. Chap 10 Prob. 19 System 1

19. For each one of the system in Figure P10.6, estimate the transient response using Bode Plots. [Section: 10.10]



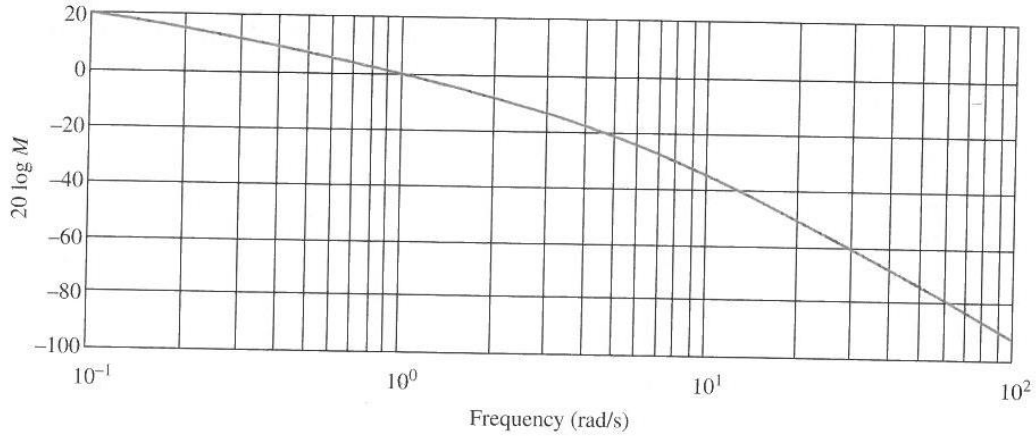
System 1

5. Chap 10 Prob. 22

22. The Bode plots for a plant, $G(s)$, used in a unity-feedback system are shown in Figure P10.7. Do the following:

a. Find the gain margin, phase margin, zero dB frequency, 180° frequency, and the closed-loop bandwidth.

b. Use your results in Part **a** to estimate the damping ratio, percent overshoot, settling time, and peak time.



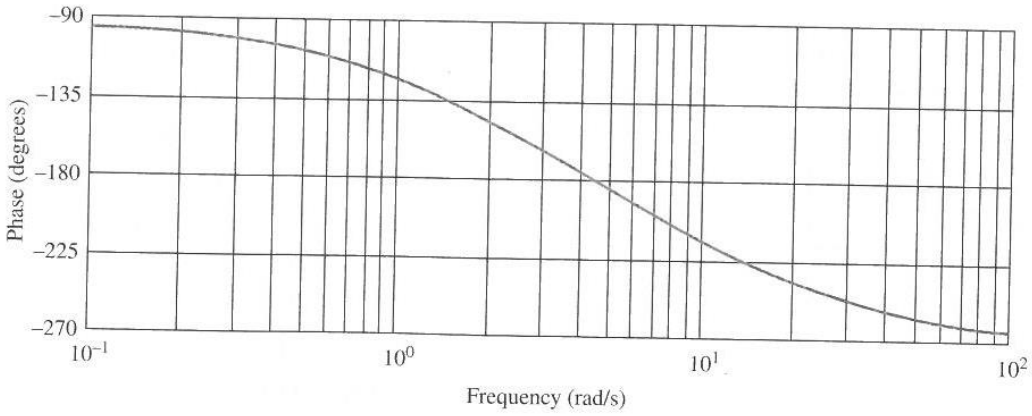


FIGURE P10.7

Submission place and deadline:

先進流體傳動控制實驗室 AFPCL R139 / 12:00 pm, December 24, 2019