Modern Control Systems

Assignment Translation

for the Eighth Lesson

Automatic Control Systems, Second Edition

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8. (4) Given the following open-loop transfer function of a minimum-phase system, compose the Bode magnitude plot of the system (draw the asymptotic lines). Please also determine if the system is stable, and calculate the phase margin and the gain margin of the system.

$$G_0(s) = \frac{20}{s(10s+1)(0.25s+1)(0.1s+1)}$$

9. For the following open-loop transfer functions of unity feedback systems, discuss the effect on the phase margins of the systems when K ($K > 0$) varies.

$$(1)\ G_0(s) = \frac{K}{s(T_1 s+1)(T_2 s+1)}$$

$$(2)\ G_0(s) = \frac{K(Ts+1)}{s^2}$$

10. For the following open-loop Bode magnitude plots (asymptotic lines) of minimum-phase systems shown in Fig. T4.3 (a) and Fig. T4.3 (d), find the open-loop transfer functions of the systems. Please also calculate the phase margins of the systems, and determine if the systems are stable.

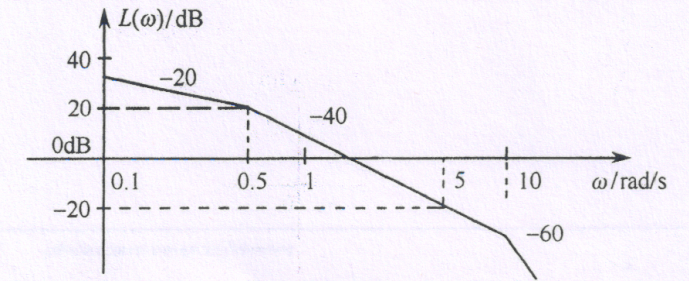

Fig. T4.3 (a)

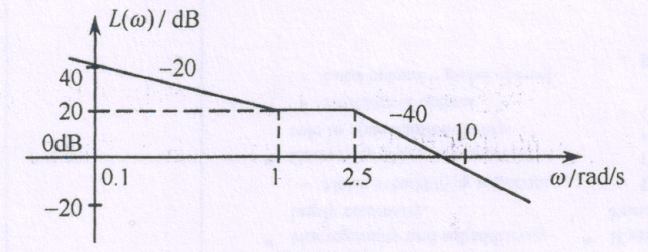

Fig. T4.3 (d)