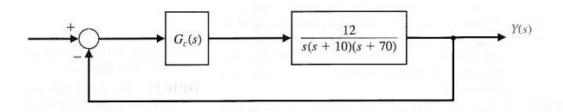
Due Date: 97.3.15 - 23:00





Desired characteristics:

Overshoot: less than 5%

Settling time: less than 0.6s

Steady-state error: less than 1.5%

1- Open loop analysis(Step response)

- Find Mp, Tp, Tr, Ts, Ess.
- Plot Bode & Nyquist diagrams.
- Find gain margin & phase margin.
- Plot root Locus diagrams.
- 2- Design the following controllers based on the desired characteristics.
 - a. **Lead-lag** controller.
 - Time domain with root Locus method.
 - Frequency domain with bode method
 - b. **PID** controller.
 - c. State feedback controller.
- 3- Simulate & implement the closed-loop system with all above controllers, separately in the Simulink.
 - Plot the control signal.
 - Compare the closed-loop output and input signals with the different designed controllers.

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- 4- Investigate the effect of variations of the main model parameters without changing the controllers and compare the results. (For example: change the value of a model parameter by 10%)
- ❖ In all above sections, student's personal conclusion in few paragraphs is necessary.

Note:

Please pay attention to the deadline of your homework.

Please put all m files, Simulink files, plots and project report (pdf) in a zip file.

Please send your homework to "9631075" in the sess system.