

EE 475 Fall 2011 Final

Part 1: Controller Design in Matlab

Due time: email time stamp before 11:59am, 12/9/2011

A control system has unity feedback gain and plant transfer function

$$G_p(s) = 1.732 \cdot 10^8 / \{s(s+400.26)(s+3008)\}.$$

Design a controller to achieve the following required specifications:

- Ess to step input is 0
- Ess to ramp input is 0
- Step response rise time $t_r \leq 3$ ms
- Settling time for 2% tolerance $t_s \leq 5$ ms
- Maximum overshoot M_p between 3% and 9%
- Closed-loop resonance peak $M_r \leq 1.1$ (in value, not dB)
- Closed-loop bandwidth $BW \geq 1000$ rad/sec

An optional specification: Ess to parabolic input is zero.

Restrictions: Controller order (denominator degree) must be ≤ 2 ;

and controller numerator degree – denominator degree ≤ 1 .

Documents to be submitted as email attachment:

- An m-file that I can just run without any user input
- A pdf or word file containing evidence that all specifications are met