

Control Engineering II

Topic 6: Controller Design by Direct Synthesis

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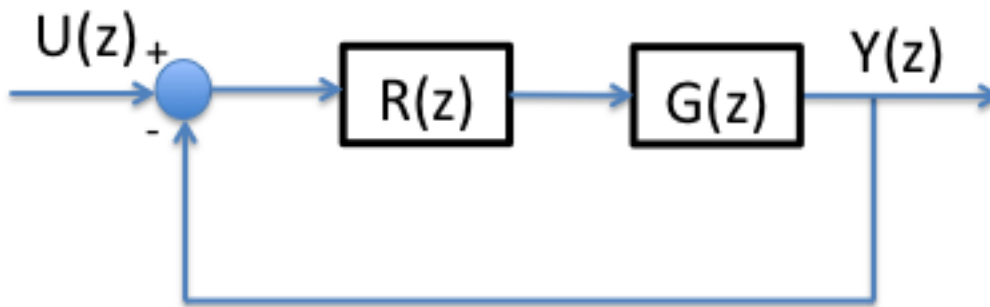
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Problem 1

Design a regulator by direct synthesis for the system of the following figure that meets the following specifications: $M_p \leq 10$, $n_s \leq 10$ samples. Consider two situations:

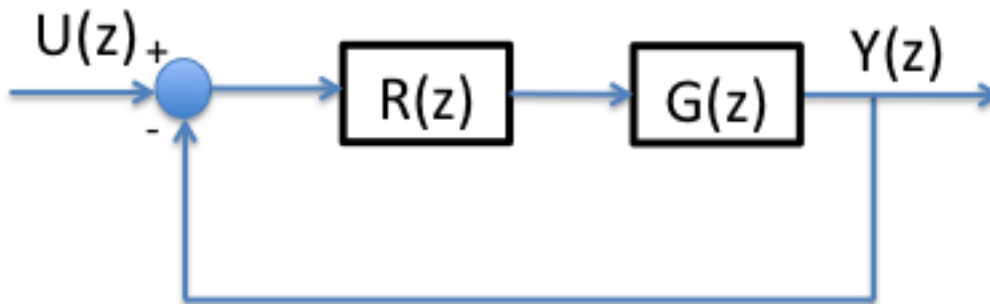
- Do not impose any condition for the system gain.
- Impose zero position error



$$G(z) = \frac{z - 0.8}{(z + 0.5)(z - 0.5)}$$

Problem 2

Design a regulator by direct synthesis for the system of the following figure that meets the following specifications: $e_p = 0$, $n_s \approx 5$ and $n_p \approx 3$ samples.



$$G(z) = \frac{(z - 0.5)(z - 0.1)}{(z - 1)(z - 1.2)(z - 0.6)}$$

Problem 3

Design a regulator by direct synthesis for the unit feedback system and given transfer function to meet the following specifications: $e_p = 0$, $M_p = 15$ and $n_s \approx 10$ samples.

$$G(z) = \frac{(z + 0.5)(z - 1.1)}{(z + 1.2)(z - 0.2)(z + 0.4)}$$

Problem 4

Design a regulator by direct synthesis for the unit feedback system and given transfer function to have zero position error and closed-loop poles at 0.9 and 0.8:

$$G(z) = \frac{(z + 1.2)(z + 0.6)}{(z - 1)(z + 0.5)(z - 0.3)}$$