Computerized Control - Polynomial design

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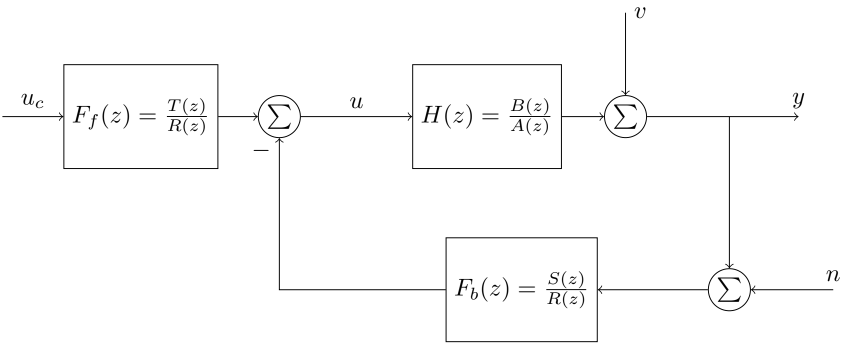
Two-degree-of-freedom controller



Åström & Wittenmark problem 5.3

Consider the system given by the pulse-transfer function

$$H(z) = \frac{z + 0.7}{z^2 - 1.8z + 0.81}$$

Use polynomial design (RST) to determine a controller such that the closed-loop system from command input to output has the characteristic polynomial

$$A_c(z) = z^2 - 1.5z + 0.7.$$

Let the observer polynomial have as low order as possible, and place all observer poles in the origin (deadbeat observer). Consider three cases

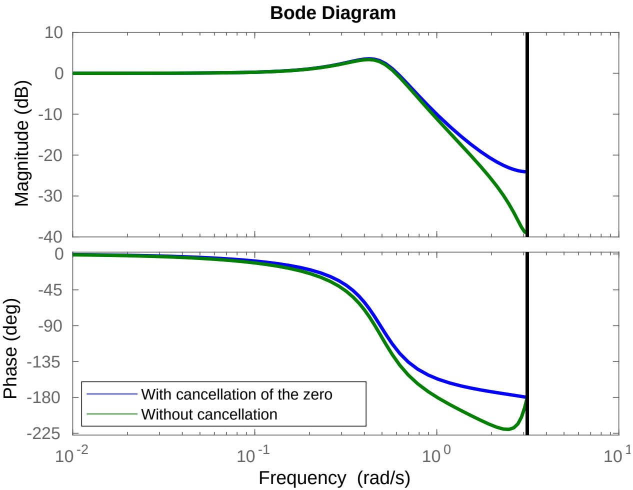
(a) Positional control with cancellation of the process zero

(b) Positional control with no cancellation of the zero

(c) Incremental controller with no cancellation of the zero

Why cancel the process zero?

Bode plots of closed-loop systems (from reference signal to output) with and without cancellation of the process zero:



Preliminary exercise

Which of the closed-loop responses below corresponds to (I) Positional control with zero cancellation (II), Positional control without zero cancellation, (III) Incremental control without zero cancellation.