Example 5.11

A ripple-free deadbeat controller

$$G(s) = \frac{1}{s(s+1)} \qquad T = 0.1$$

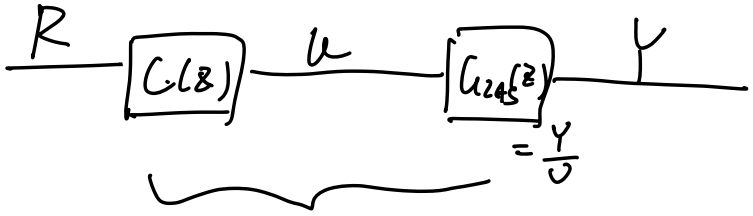
Solution $G_{zas}(z) = (1-z^{-1})\, z\left\{\frac{G(s)}{s}\right\}$ $\quad z\left\{\frac{a^2}{s^2(s+a)}\right\}\Big|_{a=1}$ #13

$$= \frac{0.004837(1+0.9672z^{-1})z^{-1}}{(1-z^{-1})(1-0.9048z^{-1})}$$

$$\frac{[(0.1-1+e^{-0.1})+(1-e^{-0.1}-0.1e^{-0.1})z^{-1}]z^{-1}}{(1-z^{-1})(1-e^{-0.1}z^{-1})}$$

$$R(z) = \frac{1}{1-z^{-1}}$$ why step ?

$$U(z) = G_{cl}(z)\frac{R(z)}{G_{zas}(z)} = G_{cl}(z)\frac{1-0.9048z^{-1}}{0.004837(1+0.9672z^{-1})z^{-1}}$$



$$G_{cl}(z) = \frac{Y}{R}$$

what is type 1 ?

why type 1 has 积分器 ✓

G_{ZAS} 有 poles $z=1$ $\quad 1-G_{ol}(z)$ zero

$U(z) = a_0 + a_1 z^{-1}$

设计的 $G_{cl}(z) = K z^{-1}(1+0.9672 z^{-1})$ ✗

① K

② 通过 G_{ZAS} 设计 $G_{cl}(z) = \dfrac{z^{-1}(1+0.9672z^{-1})[a_0+a_1 z^{-1}]}{206.7218(1+0.9048z^{-1})}$

③ $G_{ol}(1)$ 求 K

$U(z) = K \times 206.7218(1-0.9048 z^{-1})$?✓

$G_{cl}(1) = 1 \qquad K = 2.5083$?✓

$C(z) = \dfrac{105.1z - 95.08}{z + 0.4917}$?✓

$C(z) = \dfrac{1}{G_{ZAS}(z)} \dfrac{G_a(z)}{1 - G_{ol}(z)}$

$= \dfrac{(1-z^{-1})(1-0.9048z^{-1})}{0.0048374(1+0.9672z^{-1})z^{-1}} \dfrac{0.5083 z^{-1}(1+0.9672z^{-1})}{1-0.5083z^{-1}(1+0.9672z^{-1})}$

$= \dfrac{105.0771(z-1)(z-0.9048)}{z^2 - 0.5083(z+0.9672)}$

$= \dfrac{105.1z - 95.09}{z + 0.4916}$

$$z^2 - 0.5083z - 0.4916$$

$$(z-1)(z+0.4916)$$