1. Dual-zero Single-pole controller

$fs := 200 \cdot kHz$ Calculation frequency

$Ts := \frac{1}{fs}$

$K_{DC} := 3.302 \times 10^{4}\ s^{-1}$ $f_{z0} := 3kHz$ $f_{z1} := 60kHz$ $f_{p1} := 679.175 \cdot kHz$

$z_0(f_{z0}) := 2 \cdot \pi \cdot f_{z0}$ $z_1(f_{z1}) := 2 \cdot \pi \cdot f_{z1}$ $p_1(f_{p1}) := 2 \cdot \pi \cdot f_{p1}$

$$G\_2p2z(K_{DC}, z_0, z_1, p_1, s) := K_{DC}\left(\frac{p_1}{z_0 \cdot z_1}\right) \cdot \frac{(s + z_0) \cdot (s + z_1)}{s \cdot (s + p_1)}$$

Do tustin translation , then: Dual-zero Single-pole controller

$$Gv\_2p2z\left(K_{DC}, z_0(f_{z0}), z_1(f_{z1}), p_1(f_{p1}), \frac{2}{T} \cdot \frac{1 - z^{-1}}{1 + z^{-1}}\right) \left|\begin{array}{l}\text{substitute}, z = invz^{-1} \\ \text{simplify} \\ \text{collect}, invz\end{array}\right. \rightarrow Gv\_2p2z\left(\frac{33020.0}{s}, 6 \cdot \pi \cdot kHz, 1\right.$$

$$K_{A1}(f_{p1}) := \frac{4 \cdot fs}{p_1(f_{p1}) + 2 \cdot fs}$$

$$K_{A2}(f_{p1}) := \frac{p_1(f_{p1}) - 2 \cdot fs}{p_1(f_{p1}) + 2 \cdot fs}$$

$$K_{B0}(K_{DC}, f_{z0}, f_{z1}, f_{p1}) := \frac{\left(K_{DC} \cdot \frac{p_1(f_{p1})}{z_0(f_{z0}) \cdot z_1(f_{z1})}\right) \cdot (z_1(f_{z1}) + 2 \cdot fs)(z_0(f_{z0}) + 2 \cdot fs)}{2 \cdot fs \cdot (p_1(f_{p1}) + 2 \cdot fs)}$$

$$K_{B1}(K_{DC}, f_{z0}, f_{z1}, f_{p1}) := \frac{\left(K_{DC} \cdot \frac{p_1(f_{p1})}{z_0(f_{z0}) \cdot z_1(f_{z1})}\right) \cdot \left[(z_0(f_{z0}) + 2fs) \cdot (z_1(f_{z1}) - 2fs) + (z_1(f_{z1}) + 2fs) \cdot (z_0(f_{z0}\right.}{2 \cdot fs \cdot (p_1(f_{p1}) + 2 \cdot fs)}$$

$$K_{B2}(K_{DC}, f_{z0}, f_{z1}, f_{p1}) := \frac{\left(K_{DC} \cdot \frac{p_1(f_{p1})}{z_0(f_{z0}) \cdot z_1(f_{z1})}\right) \cdot (z_1(f_{z1}) - 2fs)(z_0(f_{z0}) - 2fs)}{2fs \cdot (p_1(f_{p1}) + 2 \cdot fs)}$$

$k_{a1} := K_{A1}(f_{p1}) = 0.171402$

$k_{a2} := K_{A2}(f_{p1}) = 0.828598$

$k_{b0} := K_{B0}(K_{DC}, f_{z0}, f_{z1}, f_{p1}) = 3.456584$

$$k_{b1} := K_{B1}\left(K_{DC}, f_{z0}, f_{z1}, f_{p1}\right) = -3.247829$$

$$k_{b2} := K_{B2}\left(K_{DC}, f_{z0}, f_{z1}, f_{p1}\right) = 0.093146$$

$$Gv2p2z(z) := \frac{k_{b0} + k_{b1} \cdot z^{-1} + k_{b2} \cdot z^{-2}}{1 - k_{a1} z^{-1} - k_{a2} \cdot z^{-2}}$$

1. Dual-zero Single-pole controller----Reverse

ka1 := 0.1714023419

ka2 := 0.8285976581

kb0 := 4.1703226660

kb1 := −5.9120992707

kb2 := 1.9495912223

$$p1 := \left(\frac{4fs}{ka1} - 2fs\right) \cdot \frac{1}{2\pi} = 6.79175 \times 10^{5}\, s^{-1}$$

$$p1 := \left(\frac{2fs \cdot ka2 + 2fs}{1 - ka2}\right) \cdot \frac{1}{2\pi} = 6.79175 \times 10^{5}\, s^{-1}$$

$$kdc := \frac{kb0 + kb1 + kb2}{4 \cdot \frac{p1}{[2fs \cdot (p1 + 2 \cdot fs)]}} = 3.302 \times 10^{4}\, s^{-1}$$

$$20 \cdot \pi \cdot \text{kHz}, 4267.3823810036956455 \cdot \text{kHz}, -\frac{2 \cdot \text{invz} - 2}{T + T \cdot \text{invz}}\Bigg)$$

$$\Big) - 2\text{fs}\Big)\Big]$$