

2024 November 20

$$H(z) = \frac{1}{(1 - p_1 z^{-1})(1 - p_2 z^{-1})}$$

$$p_1 = e^{-2.05 + j0.55}$$

$$p_2 = e^{-2.05 - j0.55}$$

$$H(z) = \frac{c_1}{1 - p_1 z^{-1}} + \frac{c_2}{1 - p_2 z^{-1}} \quad ; \quad \text{what are } c_1 \text{ and } c_2 ?$$

Multiply both sides by $(1 - p_1 z^{-1})(1 - p_2 z^{-1})$ gives

$$1 = c_1(1 - p_2 z^{-1}) + c_2(1 - p_1 z^{-1})$$

Must be true for any value of z , so

$$0 = -p_2 c_1 - p_1 c_2 = -p_2 c_1 - p_1(1 - c_1)$$

$$1 = c_1 + c_2$$

$$-p_2 c_1 + p_1 c_1 = p_1$$

$$c_1 = \frac{p_1}{p_1 - p_2}$$

$$= \frac{e^{-2.05 + j0.55}}{e^{-2.05 + j0.55} - e^{-2.05 - j0.55}}$$

$$= \frac{1}{1 - e^{-1.1j}}$$

$$c_2 = \frac{1}{1 - e^{+1.1j}}$$