geg.: $G(s) = \frac{b_0}{a_0 + a_1 s + a_2 s^2} = \frac{A}{s-s_1} + \frac{B}{s-s_2}$

Partialbruchzerlegung

Z-Transformation $G(z) = \mathcal{Z}\{G(s)\}$ $z = e^{s_i T}$

$$G(z) = \frac{Az}{z - e^{s_1 T}} + \frac{Bz}{z - e^{s_2 T}} \quad ; \quad \alpha = e^{s_1 T} \; ; \; \beta = e^{s_2 T}$$

$$G(z) = \frac{Az}{z-\alpha} + \frac{Bz}{z-\beta} = \frac{(A+B)z^2 - (A\beta + B\alpha)z}{z^2 - z(\alpha+\beta) + \alpha\beta} \quad \Big| \div z^2$$

$$G(z) = \frac{(A+B) - (A\beta + \beta A)z^{-1}}{1 - (\alpha+\beta)z^{-1} + \alpha\beta \, z^{-2}}$$

$$G(z) = \frac{b_0' + b_1' z^{-1}}{1 + a_1' z^{-1} + a_2' z^{-2}} = \frac{X(z)}{U(z)}$$

$$X(z) + a_1' X(z) z^{-1} + a_2' X(z) z^{-2} = b_0' U(z) + b_1' U(z) z^{-1}$$

Bsp.: $U(z) = 1 \quad \hat{=} \quad \delta$

$$X(z) = (b_0' + b_1' z^{-1}) \cdot 1 - a_1' X(z) z^{-1} - a_2' X(z) z^{-2}$$

Rücktransformation durch Verschiebungssatz: $Z\{f_{k-v}\} = z^{-v} F(z)$

$$\underline{\underline{x[k] = b_0' \delta[k] + b_1' \delta[k-1] - a_1' x[k-1] - a_2' x[k-2]}}$$

rekursive Lösung