$$a_0 y^{(n)} + a_1 y^{(n-1)} \dots a_n y = e^{i\omega t}$$

$$y(0) = y'(0) = \dots y^{(n-1)}(0) = 0$$

$$\mathcal{L}y = \bar{y}$$

$$(a_0 p^n + a_1 p^{n-1} \dots a_n)\,\bar{y} = \frac{1}{p - i\omega}$$

$$\bar{y} = \frac{1}{p-i\omega} \cdot \frac{1}{(a_0 p^n \dots a_n)}$$

$$\bar{y} = \frac{1}{a_0}\left(\frac{A}{p-i\omega} + \sum_i \sum_k \frac{A_{ik}}{(p-p_i)^k}\right) \qquad i\omega \neq p_i$$

$$\mathcal{L}^{-1} \frac{A}{p-i\omega} = A e^{i\omega t}$$

$$\mathcal{L}^{-1} \frac{A_{ik}}{(p-p_i)^k} = A_{ik} \frac{t^{k-1} e^{p_i t}}{\Gamma(k)}$$

Einfache Wurzeln:

$$\bar{y} = \frac{1}{a_0}\left(\frac{A}{p-i\omega} + \sum_{i=1}^{n} \frac{A_i}{p-p_i}\right)$$

$$y = \frac{1}{a_0}\left(A e^{i\omega t} + \sum A_i e^{p_i t}\right)$$

$$m y'' + \rho y' + \varkappa y = \begin{cases} \sin \omega t \\ \cos \omega t \end{cases}$$

$$(m p^2 + \rho p + \varkappa)\,\bar{y} = \begin{cases} \dfrac{\omega}{p^2+\omega^2} \\ \dfrac{p}{p^2+\omega^2} \end{cases}$$

$$\bar{y} = \frac{\omega}{p^2+\omega^2} \cdot \frac{1}{m p^2 + \rho p + \varkappa}$$

$$\cancel{\bar{y} = \frac{A\omega}{p+i\omega} + \frac{B\omega}{p-i\omega} + \dots}$$

$$\bar{y} = \frac{\omega(A + pB)}{p^2+\omega^2} + \frac{C + pD}{m p^2 + \rho p + \varkappa}$$

$$1 = A\omega m p^2 + A\omega\rho p + A\omega\varkappa + B\omega\rho p^2 + B\omega\varkappa p \;\cancel{+ B\omega\varkappa} + B\omega m p^3$$
$$+ C p^2 + C\omega^2 \;\cancel{+ iD\omega^2} + D\omega^2 p \;\cancel{+ iD\omega^2} + D p^3$$

$$\cancel{(A\omega m + C) + i(B\omega m + D) = 0}$$

$$\cancel{A\omega\rho + iB\omega\rho = 0}$$

$$\cancel{(A\omega\varkappa + C\omega^2) + i(B\omega\varkappa + D\omega^2) - 1 = 0}$$

$$\cancel{A = \frac{1 - C\omega^2}{\omega\varkappa}; \quad \frac{m - m C\omega^2}{\varkappa} + C\varkappa = 0}$$

$$\cancel{A = \frac{\varkappa - m\omega^2(m\omega^2 - \varkappa)}{\omega\varkappa^2} \quad C = m\frac{m\omega^2 - \varkappa}{\varkappa}}$$

$$r = \omega^2 m - \varkappa$$

$$B = \frac{Ar - 1}{\omega^2 \rho}$$

$$A\omega^2\rho^2 + (Ar - 1)r = 0$$

$$A(\omega^2\rho^2 - r^2) = -r$$

$$B\omega m + D = 0$$

$$A\omega m + B\omega\rho + C = 0$$

$$A\omega\rho + B\omega\varkappa + D\omega^2 = 0$$

$$A\omega\varkappa + C\omega^2 = 1$$

$$A(\omega^2 m - \omega\varkappa) - B\omega^2\rho - 1 = 0$$

$$A\omega\rho + B(\omega\varkappa - \omega^2 m) = 0$$