

Fourier-Analyse / Spektrum

$x(t)$ periodisch

Grundperiode

$$T_0$$

Grundfrequenz

$$f_0 := \frac{1}{T_0}$$

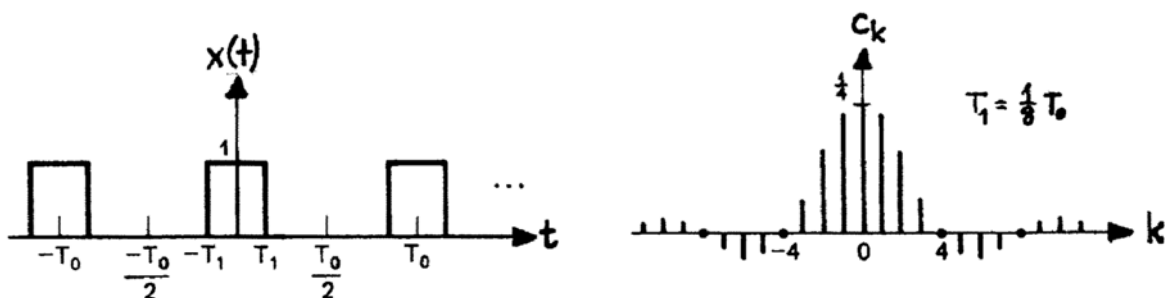
Grundkreisfrequenz

$$\omega_0 := 2\pi \cdot f_0$$

Fourier-Reihe

$$\begin{aligned} x(t) &= \hat{x}_0 + \sum_{k=1}^{\infty} \hat{x}_k \cdot \sin(k\omega_0 t + \varphi_k) \\ &= \sum_{k=-\infty}^{\infty} c_k \cdot e^{jk\omega_0 t} \end{aligned}$$

Spektrum **diskret**



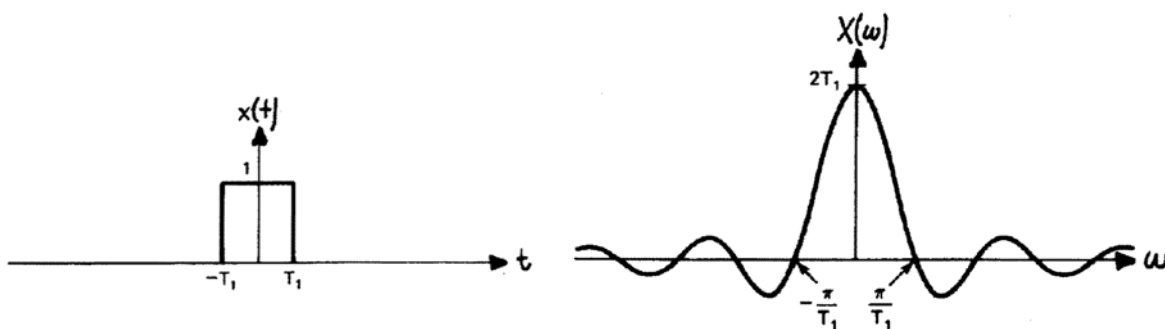
Fourier-Analyse / Spektrum

$x(t)$ aperiodisch

Fourier-Integral

$$x(t) = \frac{1}{2\pi} \int_{-\infty}^{\infty} X(\omega) \cdot e^{j\omega t} d\omega$$

Spektrum **kontinuierlich**



Fourier-Synthese einer periodischen Rechtecksfunktion

$$x_N(t) = \frac{a_0}{2} + \sum_{k=1}^N (a_k \cdot \cos(k\omega_0 t) + b_k \cdot \sin(k\omega_0 t))$$

