# Fourier integral (Fouriertransform)

## 1) General Information

Decomposition of a continuous aperiodic Signal to a continuous spectrum.

Advantages: Simplification of mathematical calculations for example convolution and multiplication.

## 2) Components of the formular

$$\boxed{\begin{array}{ll} U(f) = \int_{-\infty}^{\infty} u(t) \cdot e^{-j2\pi ft} \, dt & \text{Fouriertransform} \\ u(t) = \int_{-\infty}^{\infty} U(f) \cdot e^{+j2\pi ft} \, df & \text{Inverse transform} \end{array}}$$

$U(f) \mathrel{\hat{=}}$ Spectral amplitude density

$u(t) \mathrel{\hat{=}}$ Signal, time domain of the function

with: $u, U \in \mathbb{C}$

$t, f \in \mathbb{R}$

$dt \mathrel{\hat{=}}$ Integration over a time variable

$df \mathrel{\hat{=}}$ Integration over a frequency variable

$e^{-j2\pi ft} \mathrel{\hat{=}}$ Kernal function

↳ $e^{jx} = \cos(x) + j \cdot \sin(x)$

$e^{-jx} = \cos(x) - j \cdot \sin(x)$

Discription of an aperiodic Signal with infinite sine - and cosine - oscillations