

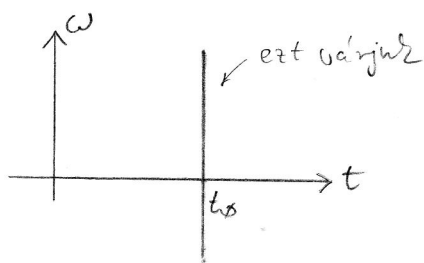
Együttes idő-frekvencia reprezentáció

Wigner-transzformáció

$$W(\omega, t) = \int_{-\infty}^{\infty} \underbrace{x\left(t + \frac{\tau}{2}\right) x^*\left(t - \frac{\tau}{2}\right)}_{\gamma(t, \tau)} e^{-j\omega\tau} d\tau = \mathcal{F}^{\tau}(\gamma(t, \tau))$$

példa

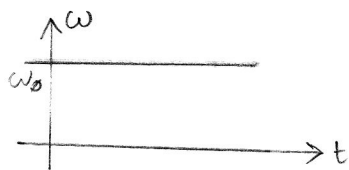
$$x(t) = \delta(t - t_0)$$



$$\begin{aligned} W(\omega, t) &= \int_{-\infty}^{\infty} \delta\left(t + \frac{\tau}{2} - t_0\right) \delta^*\left(t - \frac{\tau}{2} - t_0\right) e^{-j\omega\tau} d\tau \\ &= \delta(t - t_0) e^{-j\omega \cdot 0} = \delta(t - t_0) \end{aligned}$$

példa

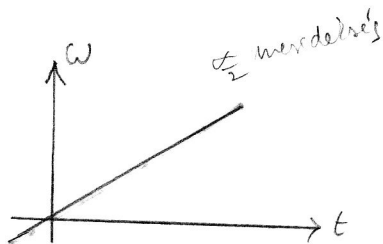
$$x(t) = e^{j\omega_0 t}$$



$$\begin{aligned} W(\omega, t) &= \int_{-\infty}^{\infty} e^{j\omega_0\left(t + \frac{\tau}{2}\right)} e^{-j\omega_0\left(t - \frac{\tau}{2}\right)} e^{-j\omega\tau} d\tau \\ &= \mathcal{F}^{\tau}\left\{e^{j\omega_0\tau}\right\} = 2\pi \delta(\omega - \omega_0) \end{aligned}$$

példa

$$x(t) = e^{j\frac{\alpha}{2} t^2}$$



$$\begin{aligned} W(\omega, t) &= \int_{-\infty}^{\infty} e^{j\frac{\alpha}{2}\left(t + \frac{\tau}{2}\right)^2} e^{-j\frac{\alpha}{2}\left(t - \frac{\tau}{2}\right)^2} e^{-j\omega\tau} d\tau \\ &= \mathcal{F}^{\tau}\left\{e^{j\alpha t\tau}\right\} = 2\pi \delta(\omega - \alpha t) \end{aligned}$$