Dagens teman

- Egenskaper hos fourierserietransformen (Arb 4, §6.2)
- Integraler av harmoniska funktioner (Arb 5, §7.1)
- Faltning (§7.2)
- Fouriertransformen (§7.3)

Viktiga egenskaper hos fourierserietransformen

L-periodisk funktionen	Fourierserie-koefficienter
$x(t)$ $y(t)$	c_n d_n
$C\,x(t) + D\,y(t)$, C och D konstanta	$C\,c_n + D\,d_n$
$x'(t)$	$\dfrac{2\pi n \mathrm{j}}{L}\,c_n$
$x''(t)$	$-\dfrac{4\pi^2 n^2}{L^2}\,c_n$
$x^{(m)}(t)$	$\left(\dfrac{2\pi n \mathrm{j}}{L}\right)^m c_n$
$x(t-a)$	$\mathrm{e}^{-2\pi n \mathrm{j} a/L} \cdot c_n$
$\sum_{n=-\infty}^{\infty} \delta(t-nL)$	$c_n = \dfrac{1}{L}$

Parsevals relation

$$\frac{1}{L}\int_{\langle L\rangle} |x(t)|^2\,\mathrm{d}t = \sum_{n=-\infty}^{\infty} |c_n|^2 .$$

Sinus cardinalis:

- $$\int_{-P/2}^{P/2} e^{2\pi j f t}\, df = \frac{\sin P\pi f}{\pi f} = P \operatorname{sinc} Pf,$$

- $$\int_{-P/2}^{P/2} e^{j\omega t}\, d\omega = \frac{\sin P\omega/2}{\omega/2} = P \operatorname{sinc}\left(P \frac{\omega}{2\pi}\right)$$

δ-*pulsen som summa av alla harmoniska signaler*:

- $$\int_{-\infty}^{\infty} e^{2\pi j f t}\, df = \delta(t),$$

- $$\int_{-\infty}^{\infty} e^{j\omega t}\, d\omega = 2\pi\,\delta(t),$$

Fouriertransformen

Syntesekvationen:

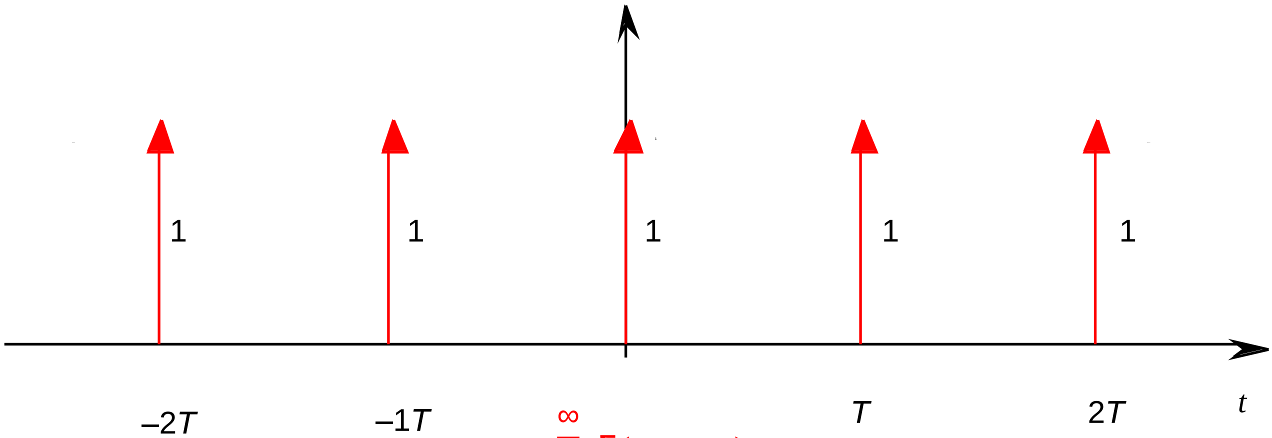
$$x(t) = \frac{1}{2\pi} \int_{-\infty}^{\infty} X(\omega)\, e^{j\omega t} d\omega$$

Analysekvationen:

$$X(\omega) = \int_{-\infty}^{\infty} x(t)\, e^{-j\omega t} dt$$

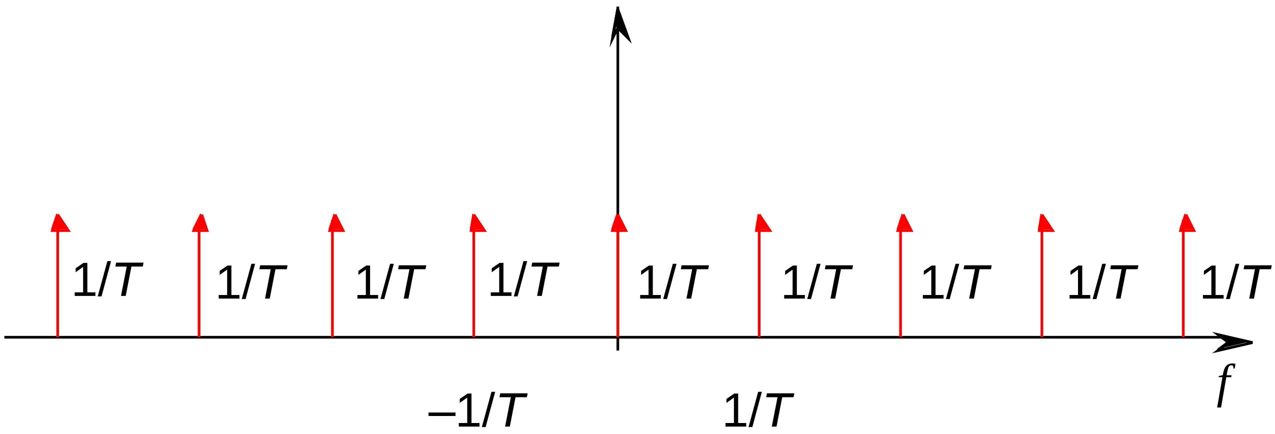
Parsevals formel:

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



$$\sum_{n=-\infty}^{\infty} \delta(t - nT)$$

har fouriertransform



$$1/T \sum_{n=-\infty}^{\infty} \delta(f - n/T) = 2\pi/T \sum_{n=-\infty}^{\infty} \delta(\omega - 2\pi n/T)$$