Dagens teman

- Summor av harmoniska funktioner (Arb 4, §5)
- Fourierserier (Arb 4, §6)

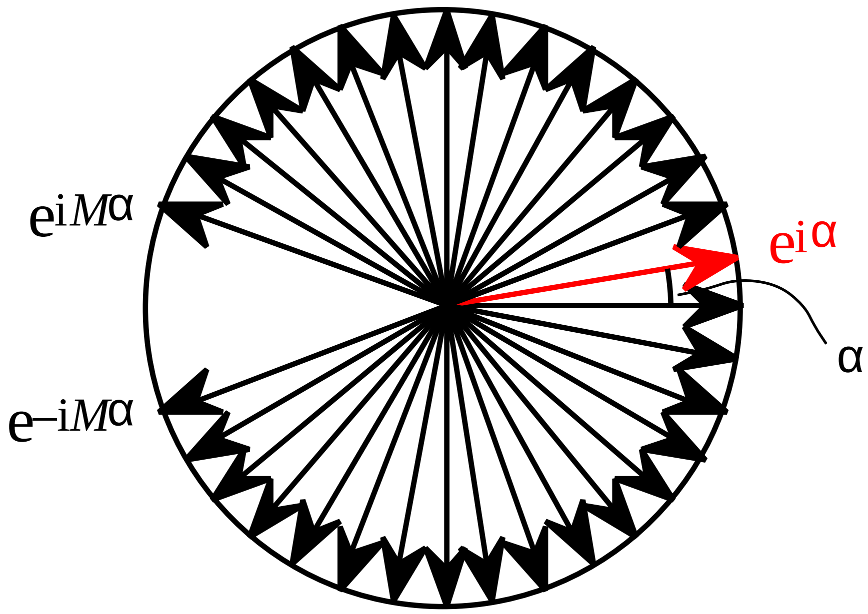
Viktiga samband

- $x(t) \cdot \delta(t - a) = x(a) \cdot \delta(t - a).$

- $\int_{-\infty}^{\infty} x(t - \tau)\, \delta(\tau - a)\, d\tau = x(t - a),$

dvs.

$$x(t) * \delta(t - a) = x(t - a).$$



$\alpha = \pi/18 = 10°$

$M = 16,\ P = 33$

Viktiga summationer

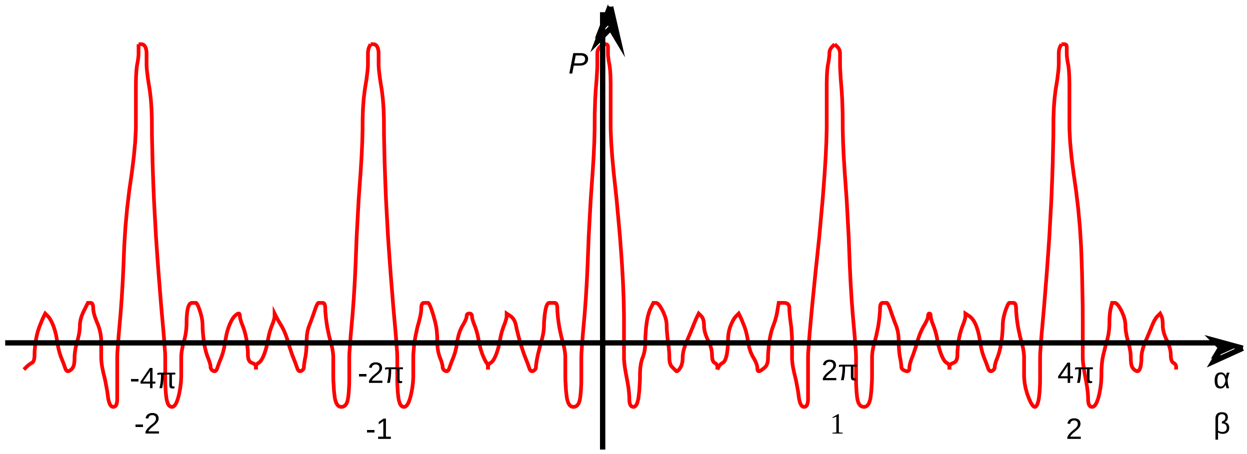
- $$\sum_{n=-M}^{M} e^{in\omega t} = \frac{\sin P\omega t/2}{\sin \omega t/2}, P = 2M + 1$$
  = antalet termer

Summa av alla harmoniska signaler med heltalsfrekvenser:

- $$\sum_{n=-\infty}^{\infty} e^{2\pi i n t} = \sum_{n=-\infty}^{\infty} \delta(t-n)$$

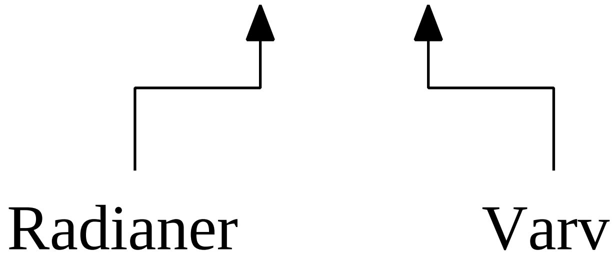
Generellare: Summa av alla *T*-periodiska harmoniska signaler

- $$\sum_{n=-\infty}^{\infty} e^{2\pi i n t/T} = T \sum_{n=-\infty}^{\infty} \delta(t-nT)$$



$$\sum_{n=-M}^{M} e^{2\pi i n\beta} = \frac{\sin P\pi\beta}{\sin \pi\beta}, \quad P = 2M+1$$

$$\alpha = 2\pi\beta$$



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	$C\,c_n + D\,d_n$
$x'(t)$	$\frac{2\pi n \mathrm{i}}{L}\,c_n$
$x''(t)$	$-\frac{4\pi^2 n^2}{L^2}\,c_n$
$x^{(m)}(t)$	$\left(\frac{2\pi n \mathrm{i}}{L}\right)^m c_n$
$x(t-a)$	$\mathrm{e}^{-2\pi n \mathrm{i} a/L} \cdot c_n$
$\sum_{n=-\infty}^{\infty} \delta(t-nL)$	$c_n = \frac{1}{L}$

Parsevals relation

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