Fourierova transformacija

$$\mathcal{F}\big[f(t)\big] = \int_{-\infty}^{+\infty} f(t)e^{-j\omega t}dt$$

Tablica $\mathcal{F}$ transformacije

$$\text{rect}\Big(\frac{t}{T}\Big) \circ\!\!-\!\!\bullet\; T\,\text{sinc}\Big(\frac{\omega T}{2\pi}\Big)$$

$$\text{sinc}(at) \circ\!\!-\!\!\bullet\; \frac{1}{a}\,\text{rect}\Big(\frac{\omega}{2\pi a}\Big)$$

$$1 \circ\!\!-\!\!\bullet\; 2\pi\delta(\omega)$$

$$\sin(\omega_0 t) \circ\!\!-\!\!\bullet\; -j\pi\big(\delta(\omega - \omega_0) - \delta(\omega + \omega_0)\big)$$

$$\cos(\omega_0 t) \circ\!\!-\!\!\bullet\; \pi\big(\delta(\omega - \omega_0) + \delta(\omega + \omega_0)\big)$$

$$\text{sgn}(t) \circ\!\!-\!\!\bullet\; \frac{2}{j\omega}$$

$$\sum_{i=-\infty}^{+\infty} \delta(t - iT_0) \circ\!\!-\!\!\bullet\; \frac{2\pi}{T_0}\sum_{i=-\infty}^{+\infty}\delta\Big(\frac{\omega}{2\pi} - \frac{i}{T_0}\Big)$$

Pri tome je:

$$\text{rect}(x) = \begin{cases} 1, & -1/2 < x < 1/2 \\ 0, & |x| > 1/2 \end{cases}$$

$$\text{sinc}(x) = \frac{\sin(\pi x)}{\pi x}$$

Laplaceova transformacija

$$\mathcal{L}\big[f(t)\big] = \int_0^{+\infty} f(t)e^{-st}dt$$

Tablica $\mathcal{L}$ transformacije

$$1 \circ\!\!-\!\!\bullet\; \frac{1}{s}$$

$$t \circ\!\!-\!\!\bullet\; \frac{1}{s^2}$$

$$e^{-at} \circ\!\!-\!\!\bullet\; \frac{1}{s+a}$$

$$\frac{1}{b-a}(e^{-at} - e^{-bt}) \circ\!\!-\!\!\bullet\; \frac{1}{(s+a)(s+b)}$$

$$\frac{1}{a-b}(ae^{-at} - be^{-bt}) \circ\!\!-\!\!\bullet\; \frac{s}{(s+a)(s+b)}$$

$$\frac{1}{a}e^{-bt}\sin(at) \circ\!\!-\!\!\bullet\; \frac{1}{(s+b)^2 + a^2}$$

$$e^{-bt}\big(\cos(at) - \frac{b}{a}\sin(at)\big) \circ\!\!-\!\!\bullet\; \frac{s}{(s+b)^2 + a^2}$$

$\mathcal{Z}$-transformacija

$$\mathcal{Z}\big[f[n]\big] = \sum_{n=0}^{+\infty} f[n]z^{-n}$$

Tablica $\mathcal{Z}$ transformacije

$$\delta[n] \circ\!\!-\!\!\bullet\; 1$$

$$\delta[n-m] \circ\!\!-\!\!\bullet\; z^{-m}$$

$$n \circ\!\!-\!\!\bullet\; \frac{z}{(z-1)^2}$$

$$1^n \circ\!\!-\!\!\bullet\; \frac{1}{1 - z^{-1}} = \frac{z}{z-1}$$

$$a^n \circ\!\!-\!\!\bullet\; \frac{1}{1 - az^{-1}} = \frac{z}{z-a}$$

$$(n+1)a^n \circ\!\!-\!\!\bullet\; \frac{z^2}{(z-a)^2}$$

$$\frac{(n+1)(n+2)}{2!}a^n \circ\!\!-\!\!\bullet\; \frac{z^3}{(z-a)^3}$$

$$\frac{(n+1)(n+2)\ldots(n+m-1)}{(m-1)!}a^n \circ\!\!-\!\!\bullet\; \frac{z^m}{(z-a)^m}$$

$$a^n - \delta(n) \circ\!\!-\!\!\bullet\; \frac{a}{z-a}$$

$$\sin(an) \circ\!\!-\!\!\bullet\; \frac{z\sin(a)}{z^2 - 2z\cos(a) + 1}$$

$$\cos(an) \circ\!\!-\!\!\bullet\; \frac{z^2 - z\cos(a)}{z^2 - 2z\cos(a) + 1}$$

Svojstva $\mathcal{Z}$ transformacije
Neka je $\mathcal{Z}\big[f[n]\big] = F(z)$ i $\mathcal{Z}\big[g[n]\big] = G(z)$. Tada vrijedi:

$$af[n] \circ\!\!-\!\!\bullet\; aF(z)$$

$$a^n f[n] \circ\!\!-\!\!\bullet\; F\big(\frac{z}{a}\big)$$

$$nf[n] \circ\!\!-\!\!\bullet\; -z\frac{dF(z)}{dz}$$

$$f[n+1] \circ\!\!-\!\!\bullet\; zF(z) - zf[0]$$

$$f[n+m] \circ\!\!-\!\!\bullet\; z^m F(z) - \sum_{i=0}^{m-1} f[i]z^{m-i}$$

$$f[n-1] \circ\!\!-\!\!\bullet\; \frac{1}{z}F(z) + f[-1]$$

$$f[n-m] \circ\!\!-\!\!\bullet\; z^{-m}F(z) + \sum_{i=0}^{m-1} f[i-m]z^{-i}$$

$$\sum_{i=0}^{+\infty} f[i]g[n-i] \circ\!\!-\!\!\bullet\; F(z)G(z)$$