Tablica Fourierovih transformacija
inačica 6.0

	CTFS *Continuous Time Fourier Series*	**CTFT** *Continuous Time Fourier Transform*	**DTFT** *Discrete Time Fourier Transform*	**DTFS** *Discrete Time Fourier Series*
Transformacija:	$X(k) = \dfrac{1}{T_0} \displaystyle\int_{T_0} x(t) e^{-jk\omega_0 t} dt$	$X(j\omega) = \displaystyle\int_{-\infty}^{\infty} x(t) e^{-j\omega t} dt$	$X(e^{j\omega}) = \displaystyle\sum_{n=-\infty}^{\infty} x(n) e^{-j\omega n}$	$X(k) = \dfrac{1}{N} \displaystyle\sum_{n=0}^{N-1} x(n) e^{-jk\omega n}$
Inverzna transformacija:	$x(t) = \displaystyle\sum_{k=-\infty}^{\infty} X(k) e^{jk\omega_0 t}$	$x(t) = \dfrac{1}{2\pi} \displaystyle\int_{-\infty}^{\infty} X(j\omega) e^{j\omega t} d\omega$	$x(n) = \dfrac{1}{2\pi} \displaystyle\int_{-\pi}^{\pi} X(e^{j\omega}) e^{j\omega n} d\omega$	$x(n) = \displaystyle\sum_{n=0}^{N-1} X(k) e^{jk\omega n}$
Parsevalova relacija:	$E = \infty$ $P_x = \dfrac{1}{T_0} \displaystyle\int_{T_0} \left|x(t)\right|^2 dt = \sum_{k=-\infty}^{\infty} \left|X(k)\right|^2$	$E = \dfrac{1}{2\pi} \displaystyle\int_{-\infty}^{\infty} \left|X(j\omega)\right|^2 d\omega$	$E = \dfrac{1}{2\pi} \displaystyle\int_{-\pi}^{\pi} \left|X(e^{j\omega})\right|^2 d\omega$	$E = \infty$ $P_x = \dfrac{1}{N} \displaystyle\sum_{k=0}^{N-1} \left|x(n)\right|^2 = \sum_{k=0}^{N-1} \left|X(k)\right|^2$
	KontPeriod → DiskSignal	KontSignal → KontSignal	DiskSignal → KontPeriod	DiskPeriod → DiskPeriod
Vremensko područje:	Kontinuiran	Kontinuiran	Diskretan	Diskretan
Frekvensijsko područje:	Diskretan	Kontinuiran	Kontinuiran	Diskretan

Vremensko područje	**Frekvencijsko područje**
Periodičan Aperiodičan	Diskretan Kontinuirani
Diskretan Kontinuirani	Periodičan Aperiodičan

	FT	**FS**
	Fourier Transform	*Fourier Series*
Transformacija:	$X(j\omega) = \int\limits_{-\infty}^{\infty} x(t)e^{-j\omega t}dt$	$X(k) = \dfrac{1}{T_0}\int\limits_{T_0} x(t)e^{-jk\omega_0 t}dt$
Inverzna transformacija:	$x(t) = \dfrac{1}{2\pi}\int\limits_{-\infty}^{\infty} X(j\omega)e^{j\omega t}d\omega$	$x(t) = \sum\limits_{k=-\infty}^{\infty} X(k)e^{jk\omega_0 t}$
	$E = \dfrac{1}{2\pi}\int\limits_{-\infty}^{\infty} |X(j\omega)|^2\, d\omega$	$E = \infty$ $P = \sum\limits_{k=-\infty}^{\infty} |X(k)|^2$

CTFS

$$\mathrm{sinc}(x) = \frac{\sin x}{x}$$

$$\mathrm{sinc}(0) = 1$$

Pravokutan periodičan signal kojemu je osnovna komponenta simetrična s obzirom na ishodište:

$$X_k = X(k) = A \cdot \frac{\tau}{T}\,\mathrm{sinc}\left(k\pi \cdot \frac{\tau}{T}\right)$$

$$X_0 = A \cdot \frac{\tau}{T}$$

Svojstva transfomacija

	CTFT	**DTFT**
Linearnost	$\alpha\, x(t) + \beta\, y(t) \xrightarrow{\ F\ } \alpha\, X(j\omega) + \beta\, Y(j\omega)$	$\alpha\, x(n) + \beta\, y(n) \xrightarrow{\ F\ } \alpha\, X(e^{j\omega}) + \beta\, Y(e^{j\omega})$
Vremenski pomak	$x(t - t_0) \xrightarrow{\ F\ } X(j\omega) e^{-j\omega t_0}$	$x(n - n_0) \xrightarrow{\ F\ } X(e^{j\omega}) e^{-j\omega n_0}$
Frekvencijski pomak	$x(t) e^{+j\omega_0 t} \xrightarrow{\ F\ } X(\omega - \omega_0)$	$x(n) e^{+j\omega_0 n} \xrightarrow{\ F\ } X(e^{j(\omega - \omega_0)})$
Vremensko skaliranje	$x(at) \xrightarrow{\ F\ } \dfrac{1}{|a|} X\left(j\dfrac{\omega}{a} \right)$	
Frekvencijsko skaliranje	$\dfrac{1}{|a|} x\left(\dfrac{t}{a} \right) \xrightarrow{\ F\ } X(ja\omega)$	
Konjugiranost	$x^*(t) \xrightarrow{\ F\ } X^*(-j\omega)$	$x^*(n) \xrightarrow{\ F\ } X^*(e^{-j\omega})$
Vremenska inverzija	$x(-t) \xrightarrow{\ F\ } X(-j\omega)$	$x(-n) \xrightarrow{\ F\ } X(e^{-j\omega})$
Dualnost	$X(jt) \xrightarrow{\ F\ } 2\pi x(-\omega) \qquad X(-jt) \xrightarrow{\ F\ } 2\pi x(\omega)$	
Konvolucija	$(x * y)(t) \xrightarrow{\ F\ } X(j\omega)\, Y(j\omega)$	$(x * y)(n) \xrightarrow{\ F\ } X(e^{j\omega})\, Y(e^{j\omega})$
Množenje	$x(t)\, y(t) \xrightarrow{\ F\ } \dfrac{1}{2\pi} X(j\omega) * Y(j\omega)$	$x(n)\, y(n) \xrightarrow{\ F\ } \dfrac{1}{2\pi} X(e^{j\omega}) * Y(e^{j\omega})$
Parseval	$\displaystyle\int_{-\infty}^{\infty} |x(t)|^2\, dt = \dfrac{1}{2\pi} \int_{-\infty}^{\infty} |X(j\omega)|^2\, d\omega$	$\displaystyle\sum_{n=-\infty}^{\infty} |x(n)|^2 = \dfrac{1}{2\pi} \int_{-\pi}^{\pi} |X(e^{j\omega})|^2\, d\omega$
Derivacija	$\dfrac{d^k}{dt^k}(x(t)) \xrightarrow{\ F\ } (j\omega)^k\, X(j\omega)$	$n x(n) \xrightarrow{\ F\ } \left(j\dfrac{dX(e^{j\omega})}{d\omega} \right)$
Modulacija	$x(t)\cos(\omega_0 t) \xrightarrow{\ F\ } \dfrac{1}{2}\left[X(j(\omega - \omega_0)) + X(j(\omega + \omega_0)) \right]$	$x(n)\cos(\omega_0 n) \xrightarrow{\ F\ } \dfrac{1}{2}\left[X(e^{j(\omega - \omega_0)}) + X(e^{j(\omega + \omega_0)}) \right]$
Integracija	$\displaystyle\int_{-\infty}^{t} x(\lambda)\, d\lambda \xrightarrow{\ F\ } \dfrac{X(j\omega)}{j\omega} + \pi X(0)\delta(\omega)$	