

properties of the DTFT		
Property	Aperiodic signal	FT
	$x[n], y[n]$	$X(e^{j\omega}), Y(e^{j\omega})$ period of $2\pi$
linearity	$ax[n]+by[n]$	$aX(e^{j\omega})+bY(e^{j\omega})$
time sifting	$x[n-n_0]$	$e^{-j\omega n_0}X(e^{j\omega})$
frequency shift	$e^{j\omega_0 n}x[n]$	$X(e^{j(\omega-\omega_0)})$
conjugation	$x^*[n]$	$X^*(e^{-j\omega})$
time reversal	$x[-n]$	$X(e^{j\omega})$
time expansion	$x(k)[n]=x[n/k]$ , if $n$ =multiple of $k$ 0, if $n$ ≠ multiple of $k$	$X(e^{jk\omega})$
convolution	$x[n]*y[n]$	$X(e^{j\omega})Y(e^{j\omega})$
Multiplication	$x[n]y[n]$	$\int_{-\pi}^{\pi} X(e^{j\theta})Y(e^{j(\omega-\theta)})d\theta$
differencing in time	$x[n]-x[n-1]$	$(1-e^{-j\omega})X(e^{j\omega})$
accumulation	$\sum_{k=-\infty}^n x[k]$	$(1-e^{-j\omega})^{-1}X(e^{j\omega}) + \pi \sum_{k=-\infty}^{\infty} \delta(\omega-2\pi k)$
differentiation in frequency	$nx[n]$	$J(dX(e^{j\omega}))/d\omega$

DTFT pairs		
signal	fourier tran	coefficients
$k < N > \sum_{n=-\infty}^{\infty} a_k e^{jk-2\pi n/N}$	$(2\pi)^{-1} \sum_{k=-\infty}^{\infty} a_k \delta(\omega - N^{-1}2\pi k)$	$a_k$
$e^{j\omega_0 n}$	$(2\pi)^{-1} \sum_{L=-\infty}^{\infty} \delta(\omega - \omega_0 - 2\pi L)$	$\omega_0 = 2\pi m/N$



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