TRASFORMATA DI FOURIER

Trasformata

$$\mathscr{F}\{f(x)\} = \int_{-\infty}^{\infty} f(x)\, e^{-ikx} dx$$

Antitrasformata

$$\mathscr{F}^{-1}\{f(x)\} = \int_{-\infty}^{\infty} F(k)\, e^{ikx} dk$$

PROPRIETÀ DELLA TRASFORMATA DI FOURIER

Linearità	$\mathscr{F}\{C_1 f(x) + C_2 g(x)\} = \mathrm{C}_1 \mathscr{F}\{f(x)\} + \mathrm{C}_2 \mathscr{F}\{g(x)\}$
Scala	$\mathscr{F}\{f(ax)\} = \frac{1}{\lvert a \rvert} F(\frac{k}{a})$
Simmetria	$\mathscr{F}\{\mathscr{F}\{f(x)\}\} = 2\pi g(-k)$
Traslazione in x	$\mathscr{F}\{f(x-x_0)\} = e^{-ikx_0} \mathscr{F}\{f(x)\}$
Traslazione in k	$\mathscr{F}\left\{e^{i\alpha x} f(x)\right\} = F(k-\alpha)$
Convoluzione in x	$f_1(x) * f_2(x) = F_1(k) F_2(k)$
Convoluzione in k	$f_1(x) f_2(x) = \frac{1}{2\pi}[F_1(k) * F_2(k)]$
Derivazione	$(ik)^n \mathscr{F}\{f(x)\}$

TRASFORMATE NOTEVOLI

$f(x)$	$F(k)$
$\delta_{-1}(x)$	$\pi\delta(k) \frac{1}{jk}$
$\delta_{-1}(x+a) - \delta_{-1}(x-a)$	$2\frac{sin(ka)}{k}$
$e^{-ax}\delta_{-1}(x)$	$\frac{1}{a+jk}$
$e^{ax}\delta_{-1}(-x)$	$\frac{1}{a-jk}$
$e^{-a\lvert x \rvert}$	$\frac{2a}{a^2+k^2}$
$x^n f(x)$	$(i)^n \frac{d^n}{dk^n} F(k)$
$f(x) cos(k_0 x)$	$\frac{1}{2}[F(k-k_0) + F(k+k_0)]$
$f(x) sin(k_0 x)$	$\frac{1}{2i}[F(k-k_0) - F(k+k_0)]$
e^{-ax^2}	$\sqrt{\frac{\pi}{a}} e^{-\frac{k^2}{4a}}$
$e^{ik_0 x}$	$2\pi\delta_{-1}(k-k_0)$