$$g_S(x,y) = g_X(x)g_Y(y). \tag{1.3}$$

Separability reduces the Fourier transform of a 2D function to the product of two one-dimensional (1D) transforms or

$$\Im\{g_S(x,y)\} = \Im\{g_X(x)\}\Im\{g_Y(y)\}. \tag{1.4}$$

Table 1.1 Fourier transform theorems.

Theorem	Expression
Linearity	$\Im\{Ag(x,y) + Bh(x,y)\} = A\Im\{g(x,y)\} + B\Im\{h(x,y)\}$
Similarity	$\Im\left\{g\left(\frac{x}{a},\frac{y}{b}\right)\right\} = \lvert ab\rvert G(af_X, bf_Y)$
Shift	$\Im\{g(x-a, y-b)\} = G(f_X, f_Y)\exp\left[-j2\pi(f_X a + f_Y b)\right]$
Parseval's (Rayleigh's)	$\iint \lvert g(x,y)\rvert^2 dxdy = \iint \lvert G(f_X, f_Y)\rvert^2 df_X df_Y$
Convolution	$\Im\left\{\iint g(\xi,\eta)h(x-\xi, y-\eta)d\xi d\eta\right\} = G(f_X, f_Y)H(f_X, f_Y)$
Autocorrelation	$\Im\left\{\iint g(\xi,\eta)g^*(\xi-x, \eta-y)d\xi d\eta\right\} = \lvert G(f_X, f_Y)\rvert^2$ $\Im\left\{\lvert g(x,y)\rvert^2\right\} = \iint G(\xi,\eta)G^*(\xi-f_X, \eta-f_Y)d\xi d\eta$
Cross-correlation	$\Im\left\{\iint g(\xi,\eta)h^*(\xi-x, \eta-y)d\xi d\eta\right\} = G(f_X, f_Y)H^*(f_X, f_Y)$ $\Im\{g(x,y)h^*(x,y)\} = \iint G(\xi,\eta)H^*(\xi-f_X, \eta-f_Y)d\xi d\eta$
Fourier integral	$\Im\Im^{-1}\{g(x,y)\} = \Im^{-1}\Im\{g(x,y)\} = g(x,y)$
Successive transform	$\Im\Im\{g(x,y)\} = g(-x,-y)$
Central ordinate	$\Im\{g(x,y)\}\big\rvert_{\substack{f_X=0\\ f_Y=0}} = G(0,0) = \int\int g(x,y)dxdy$ $\Im^{-1}\{G(f_X, f_Y)\}\big\rvert_{\substack{x=0\\ y=0}} = g(0,0) = \int\int G(f_X, f_Y)df_X df_Y$

Note: A, B, a, and b are scalar constants