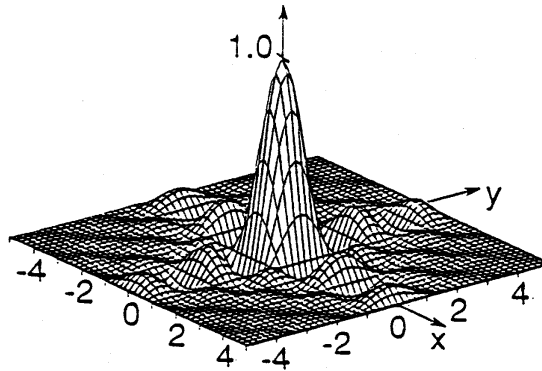
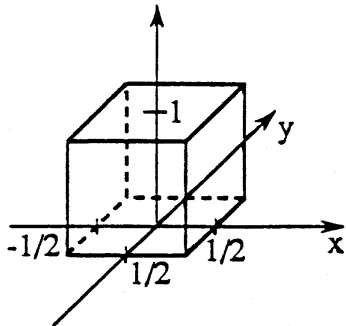
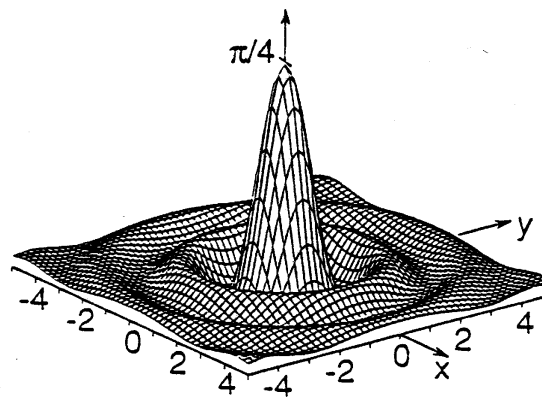
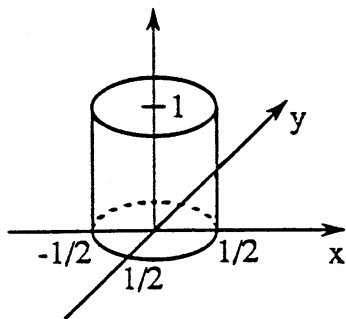


2.1.1 SPECIAL 2-D SIGNALS



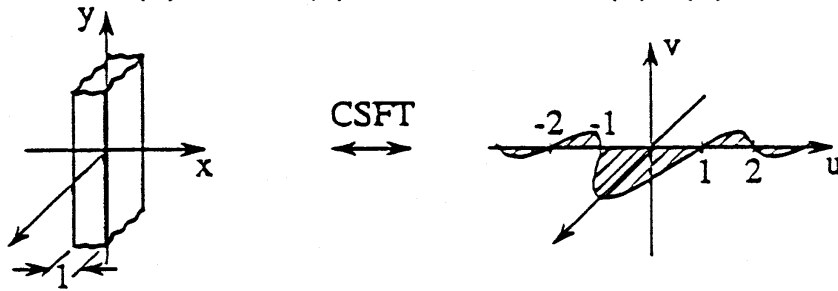
$$\text{rect}(x, y) = \begin{cases} 1, & |x|, |y| < 1/2 \\ 0, & |x|, |y| > 1/2 \end{cases} \quad \text{sinc}(x, y) = \frac{\sin(\pi x)}{\pi x} \frac{\sin(\pi y)}{\pi y}$$



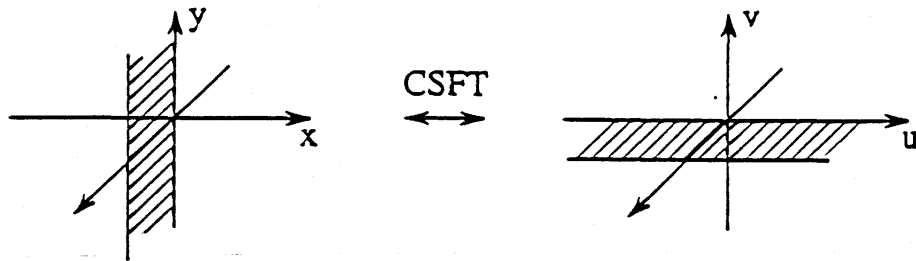
$$\text{circ}(x, y) = \begin{cases} 1, & \sqrt{x^2 + y^2} < 1/2 \\ 0, & \sqrt{x^2 + y^2} > 1/2 \end{cases} \quad \text{jinc}(x, y) = \frac{J_1\left(\pi\sqrt{x^2 + y^2}\right)}{2\sqrt{x^2 + y^2}}$$

(Bessel function of 1st kind
order 1)

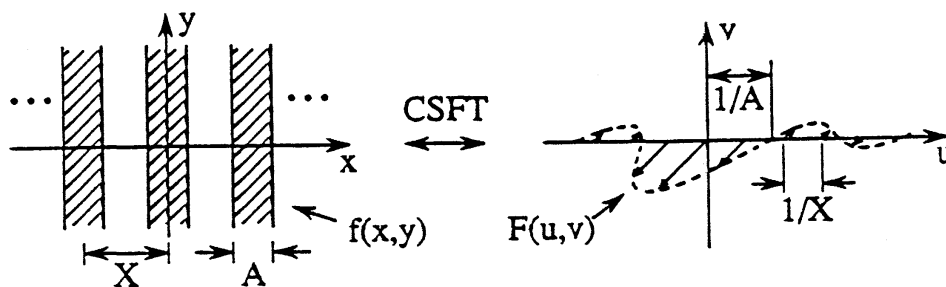
$$7. \text{rect}(x) = \text{rect}(x) \cdot 1 \xleftrightarrow{\text{CSFT}} \text{sinc}(u) \delta(v)$$



$$8. \delta(x) = \delta(x) \cdot 1 \xleftrightarrow{\text{CSFT}} 1 \cdot \delta(v) = \delta(v)$$

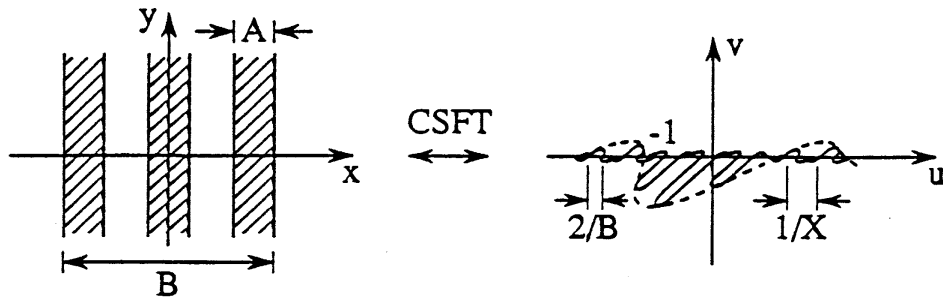


2.1.4 PERIODIC STRUCTURES



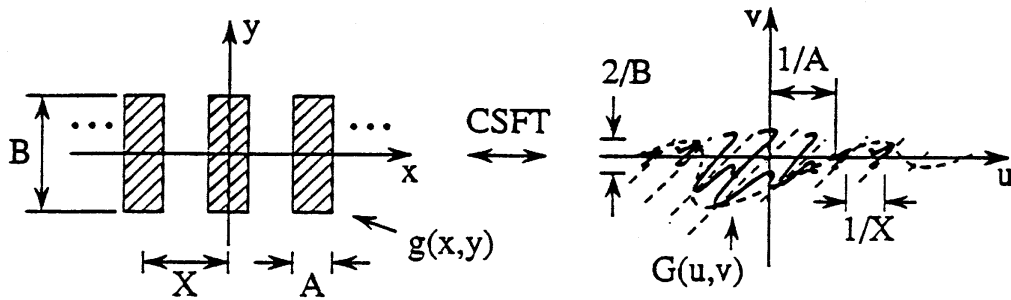
$$f(x, y) = \text{rep}_X[\text{rect}(x/A)] \cdot 1$$

$$F(u, v) = \frac{1}{X} \text{comb} \frac{1}{X} [A \text{sinc}(Au)] \delta(v)$$



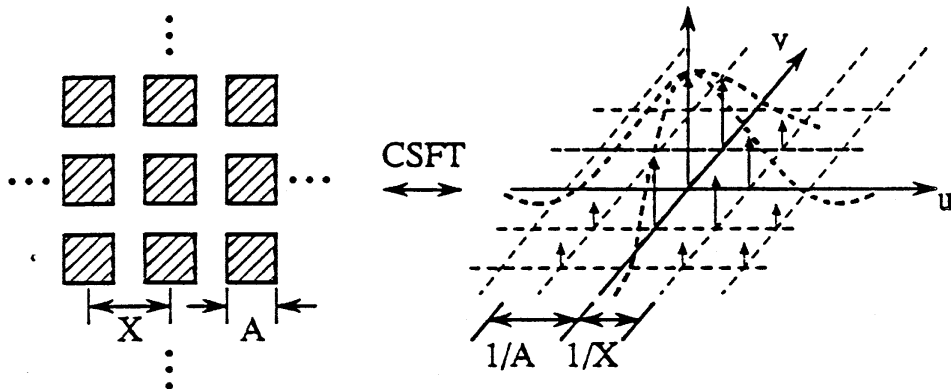
$$g(x,y) = [\text{rect}(x/B) \cdot 1] f(x,y)$$

$$G(u,v) = B \text{sinc}(Bu) \delta(v) ** F(u,v)$$



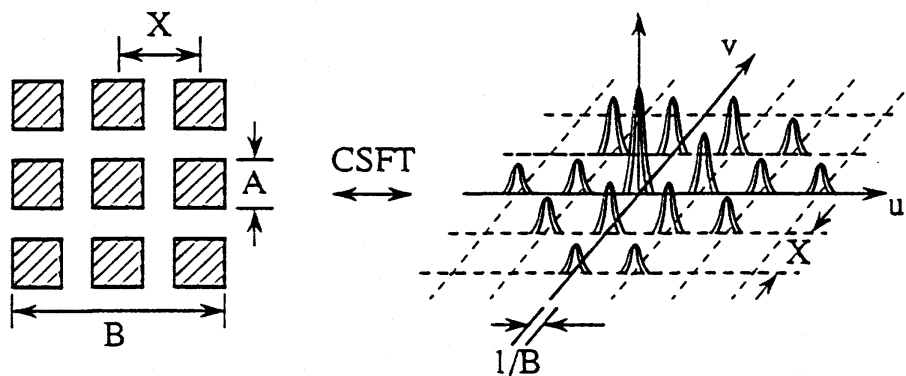
$$g(x,y) = [1 \cdot \text{rect}(y/B)] f(x,y)$$

$$G(u,v) = \delta(u) B \text{sinc}(Bv) ** F(u,v)$$



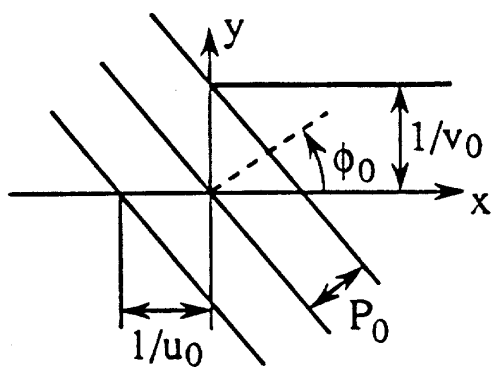
$$f(x,y) = \text{rep}_{XX} \left[\text{rect} \left(\frac{x}{A}, \frac{y}{A} \right) \right]$$

$$F(u,v) = \frac{1}{X^2} \text{comb} \frac{1}{X} \frac{1}{X} [A^2 \text{sinc}(Au, Av)]$$



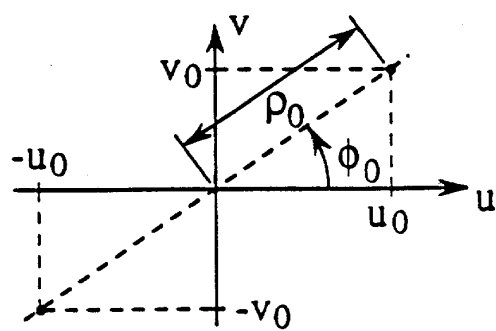
$$g(x,y) = \text{rect}\left(\frac{x}{B}, \frac{y}{B}\right) f(x,y)$$

$$G(u,v) = B^2 \text{sinc}(Bu, Bv) ** F(u,v)$$



Spatial Domain

$$\begin{aligned}\rho_0 &= \sqrt{u_0^2 + v_0^2} \\ &= 1/P_0\end{aligned}$$



Frequency Domain

$$\phi_0 = \arctan \left(\frac{v_0}{u_0} \right)$$