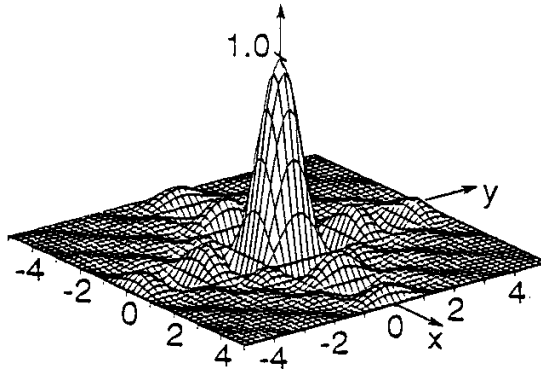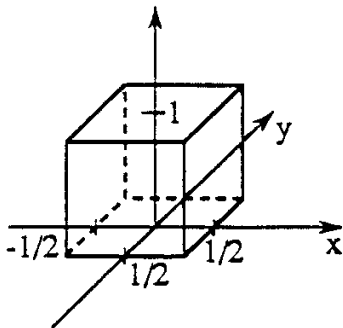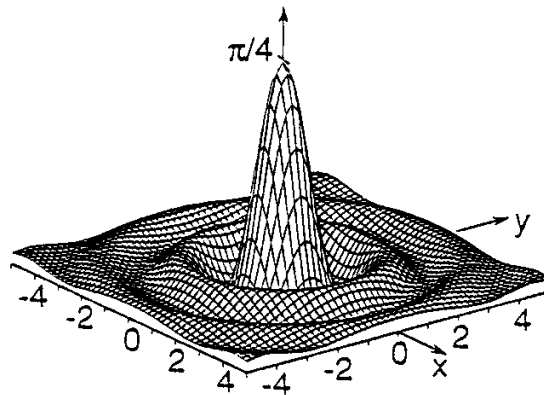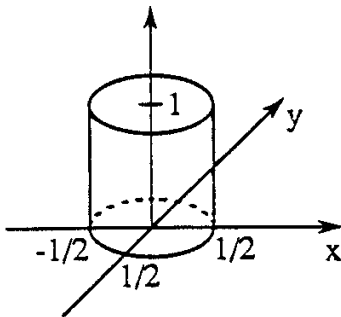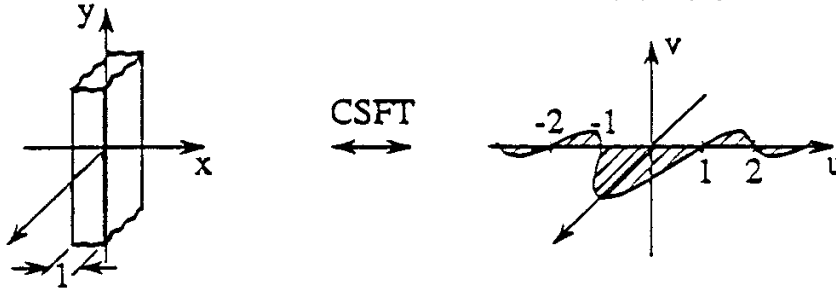# 2.1.1 SPECIAL 2-D SIGNALS

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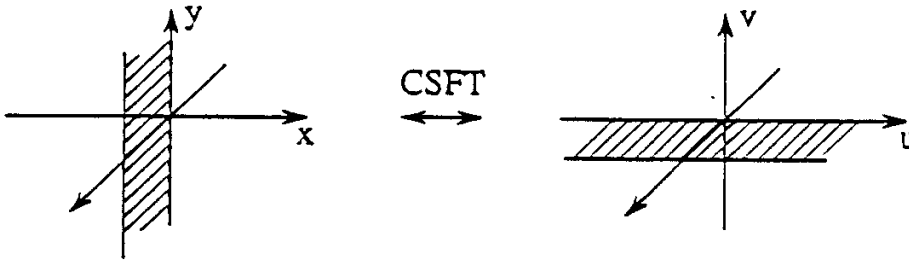

$$\text{circ}(x,y) = \begin{cases} 1, & \sqrt{x^2 + y^2} < 1/2 \\ 0, & \sqrt{x^2 + y^2} > 1/2 \end{cases} \qquad \text{jinc}(x,y) = \frac{J_1\left(\pi\sqrt{x^2 + y^2}\right)}{2\sqrt{x^2 + y^2}}$$

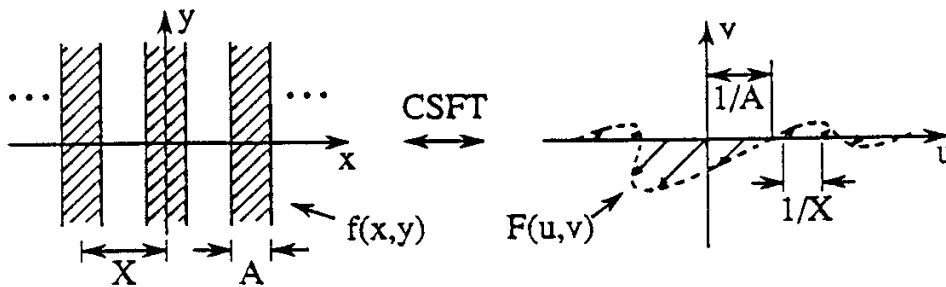(Bessel function of 1st kind
order 1)

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

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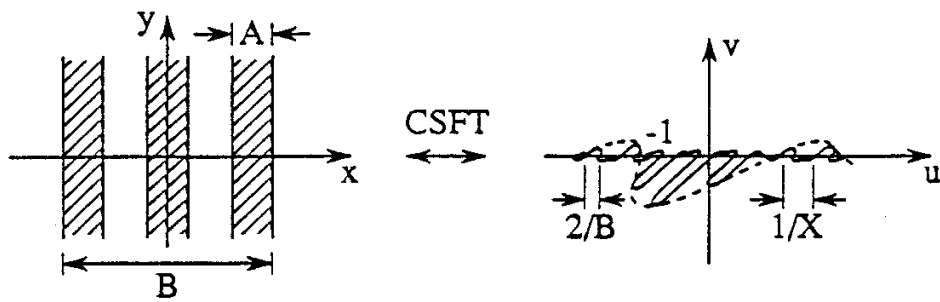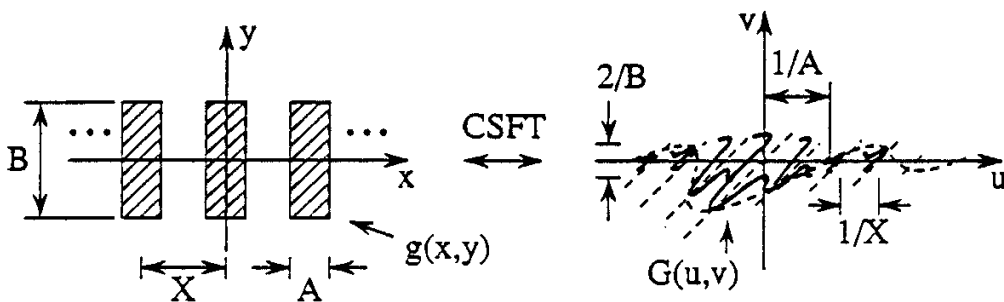

2.1.4 PERIODIC STRUCTURES

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

$$F(u,v) = \frac{1}{X} \text{comb} \frac{1}{X} [A \text{ sinc } (Au)]\,\delta(v)$$
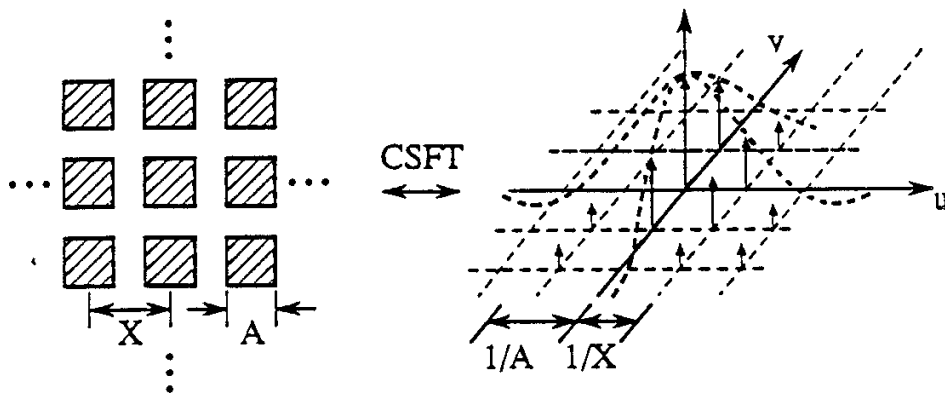
$$g(x,y) = [\text{rect}(x/B) \cdot 1] \, f(x,y)$$

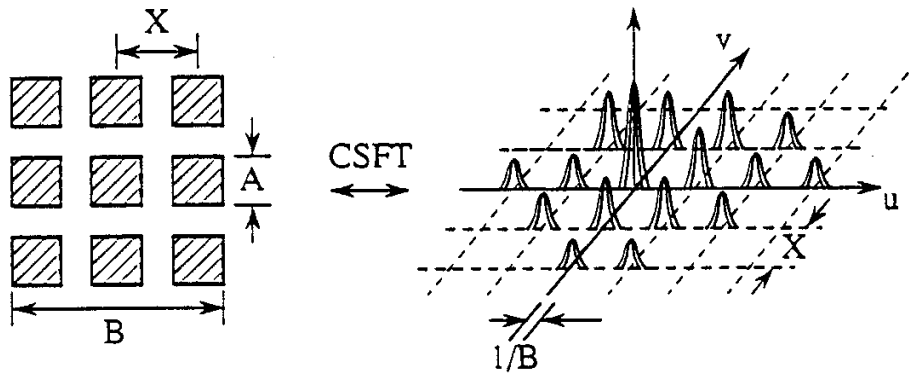$$G(u,v) = B \, \text{sinc}(Bu) \, \delta(v) ** F(u,v)$$

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

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

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

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

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

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