



# Tratamiento de Señales

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## Visualización de DFT en 2D

[ Capítulo 4 ]

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## TRANSFORMADA DISCRETA DE FOURIER

$$F(\omega, \nu) = \sum_{x=0}^{M-1} \sum_{y=0}^{N-1} f(x, y) e^{-j2\pi(\omega x/M + \nu y/N)}$$

## TRANSFORMADA DISCRETA INVERSA DE FOURIER

$$f(x, y) = \frac{1}{MN} \sum_{\omega=0}^{M-1} \sum_{\nu=0}^{N-1} F(\omega, \nu) e^{j2\pi(\omega x/M + \nu y/N)}$$

## TRANSFORMADA DISCRETA INVERSA DE FOURIER

$$f(x, y) = \frac{1}{MN} \sum_{\omega=0}^{M-1} \sum_{\nu=0}^{N-1} \underbrace{F(\omega, \nu)}_{F_{\omega\nu}} \underbrace{e^{j2\pi(\omega x/M + \nu y/N)}}_{B_{\omega\nu}(x, y)}$$
$$F_{00}B_{00}(x, y) + F_{01}B_{01}(x, y) + F_{02}B_{02}(x, y) + F_{03}B_{03}(x, y) + \cdots + F_{M-1, N-1}B_{M-1, N-1}(x, y)$$

Significado: La función  $f(x, y)$  puede ser construida como la suma ponderada de funciones base  $B_{00}(x, y)$ ,  $B_{01}(x, y)$ , ... Los factores de ponderación son  $F_{00}$ ,  $F_{01}$ , ...

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FUNCIONES BASE:

$$B_{\omega\nu}(x, y) = e^{j2\pi(\omega x/M + \nu y/N)}$$

$$B_{00}(x, y) = e^{j2\pi(0 \times x/M + 0 \times y/N)} = 1$$



$$B_{01}(x, y) = e^{j2\pi(0 \times x/M + 1 \times y/N)} = e^{j2\pi y/N}$$



$$B_{02}(x, y) = e^{j2\pi(0 \times x/M + 2 \times y/N)} = e^{j4\pi y/N}$$



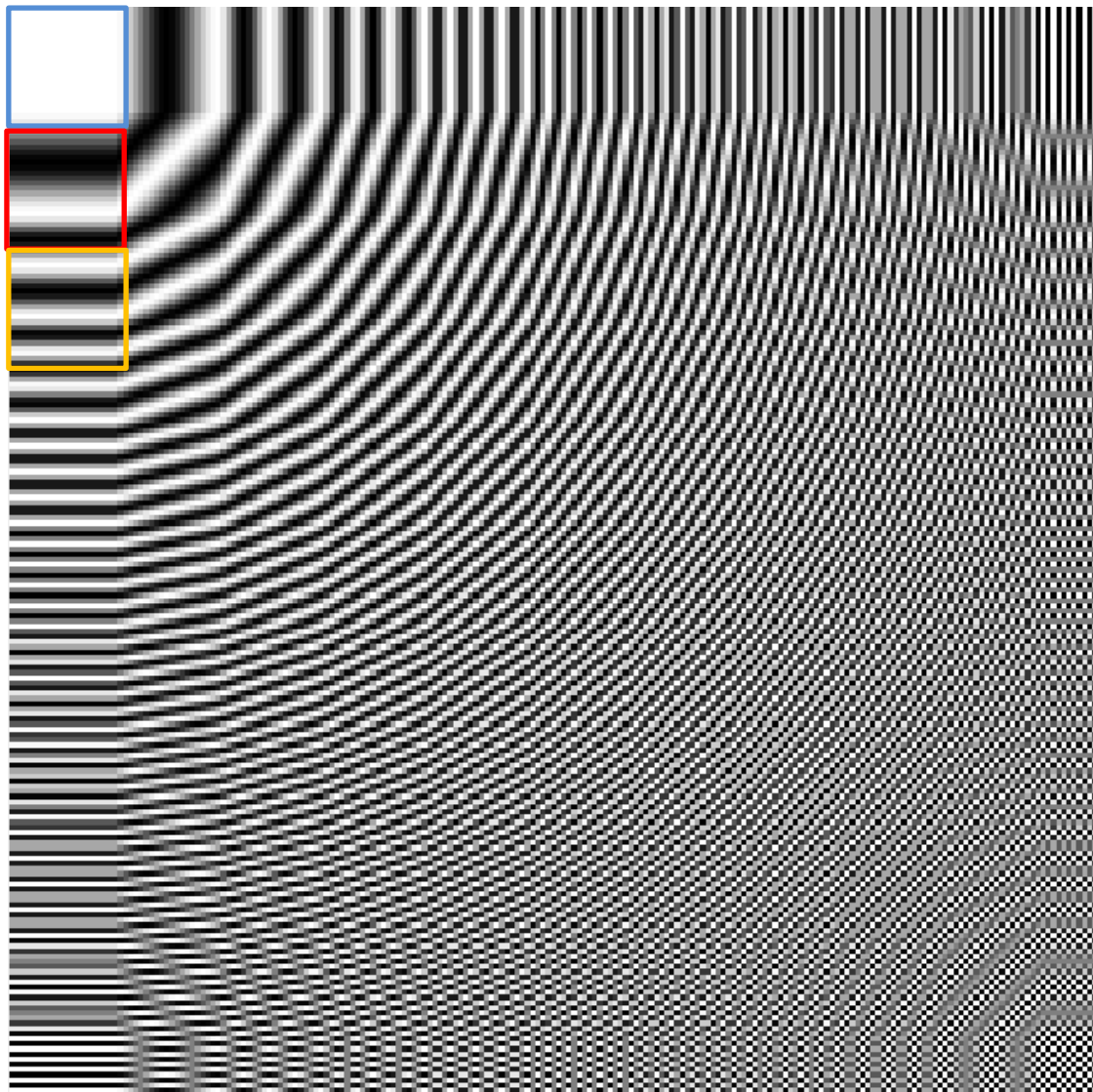
## FUNCIONES BASE:

$$B_{\omega\nu}(x, y) = e^{j2\pi(\omega x/M + \nu y/N)}$$

$B_{00}$  →

$B_{01}$  →

$B_{02}$  →

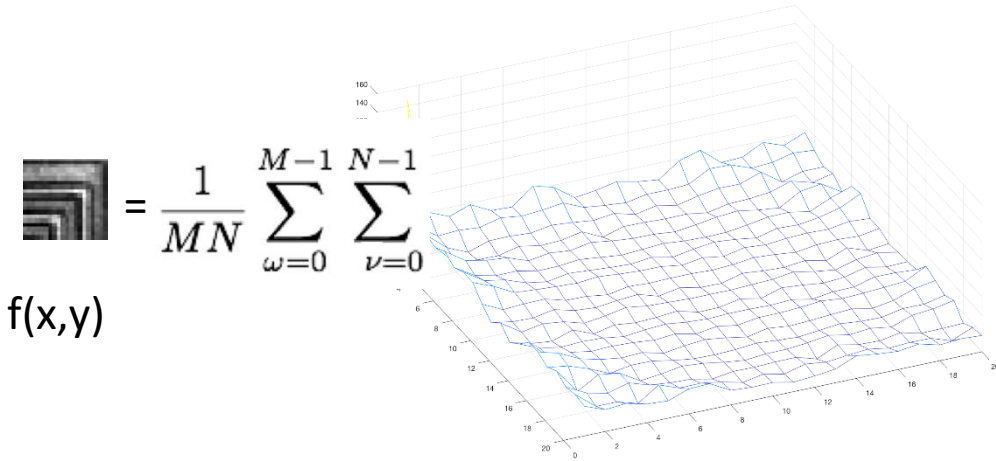


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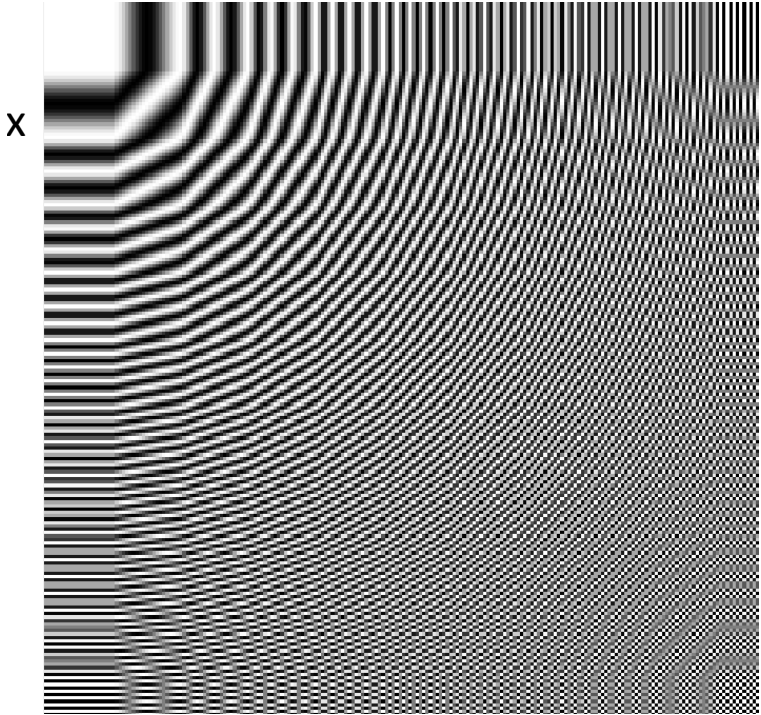
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$$F_{\omega\nu}$$



$$B_{\omega\nu}(x,y)$$