Robust Methods for Optical Interferometry Images

Ph.D Thesis

M. en C. Orlando Miguel Medina Cázares

Centro de Investigaciones en Óptica

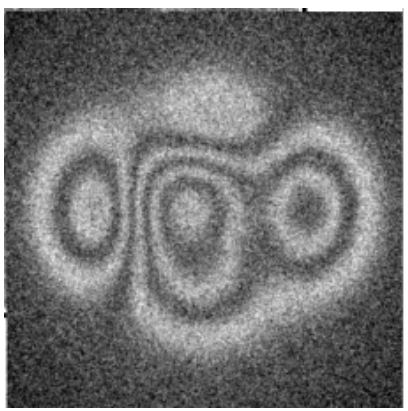
5 de Noviembre del 2015

Asesor: Dr. Julio Estrada Rico.
Co-Asesor: Dr Manuel Servin Guirado.

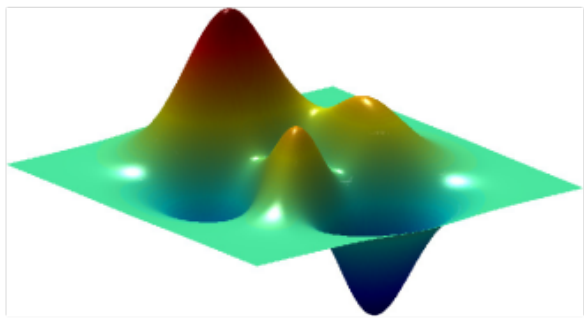
Algoritos de Cuadratura

Patrón de franjas:

$$I(x,y) = a(x,y) + b(x,y)cos[\phi(x,y)] \tag{1}$$



$$= a + b\ cos[$$

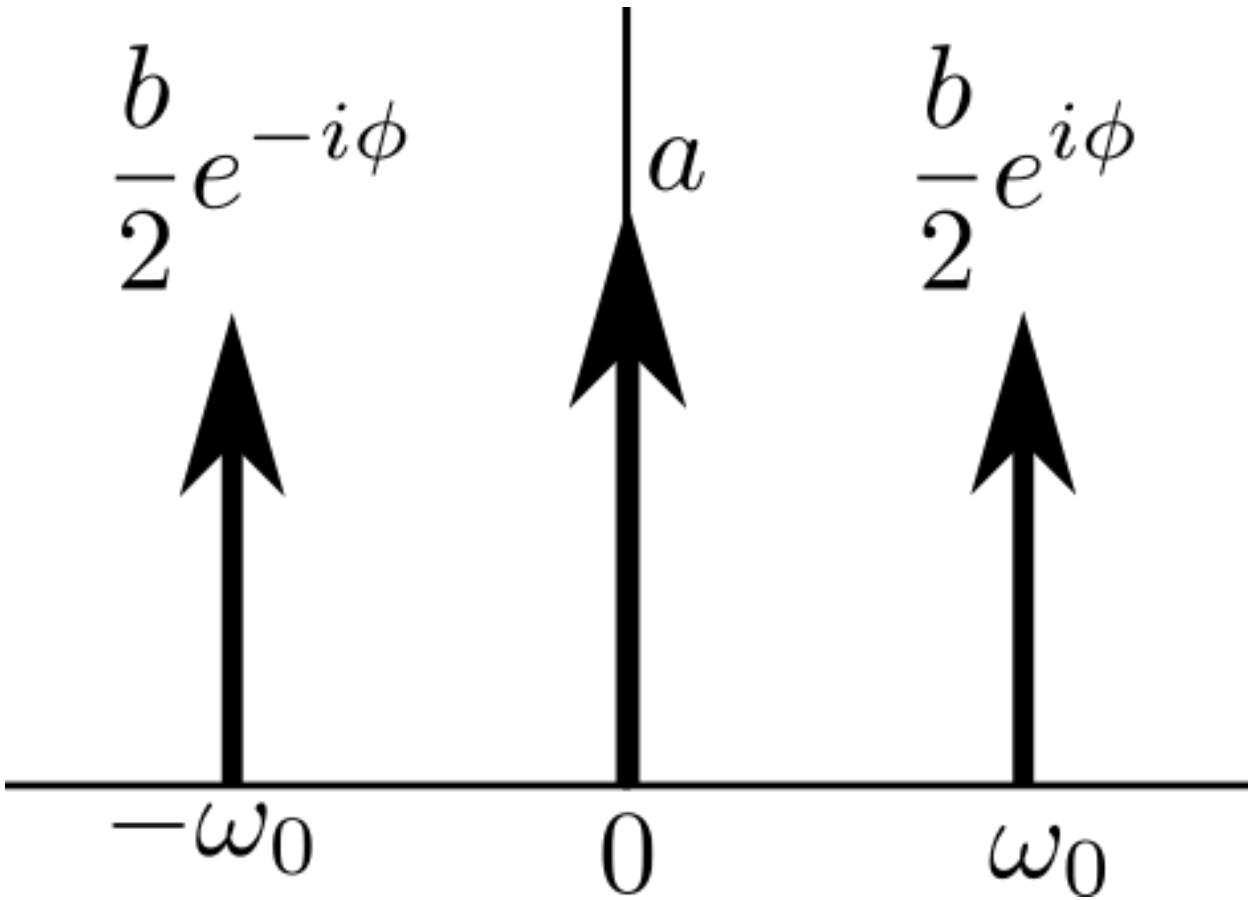


$$]$$

Algoritos de Cuadratura

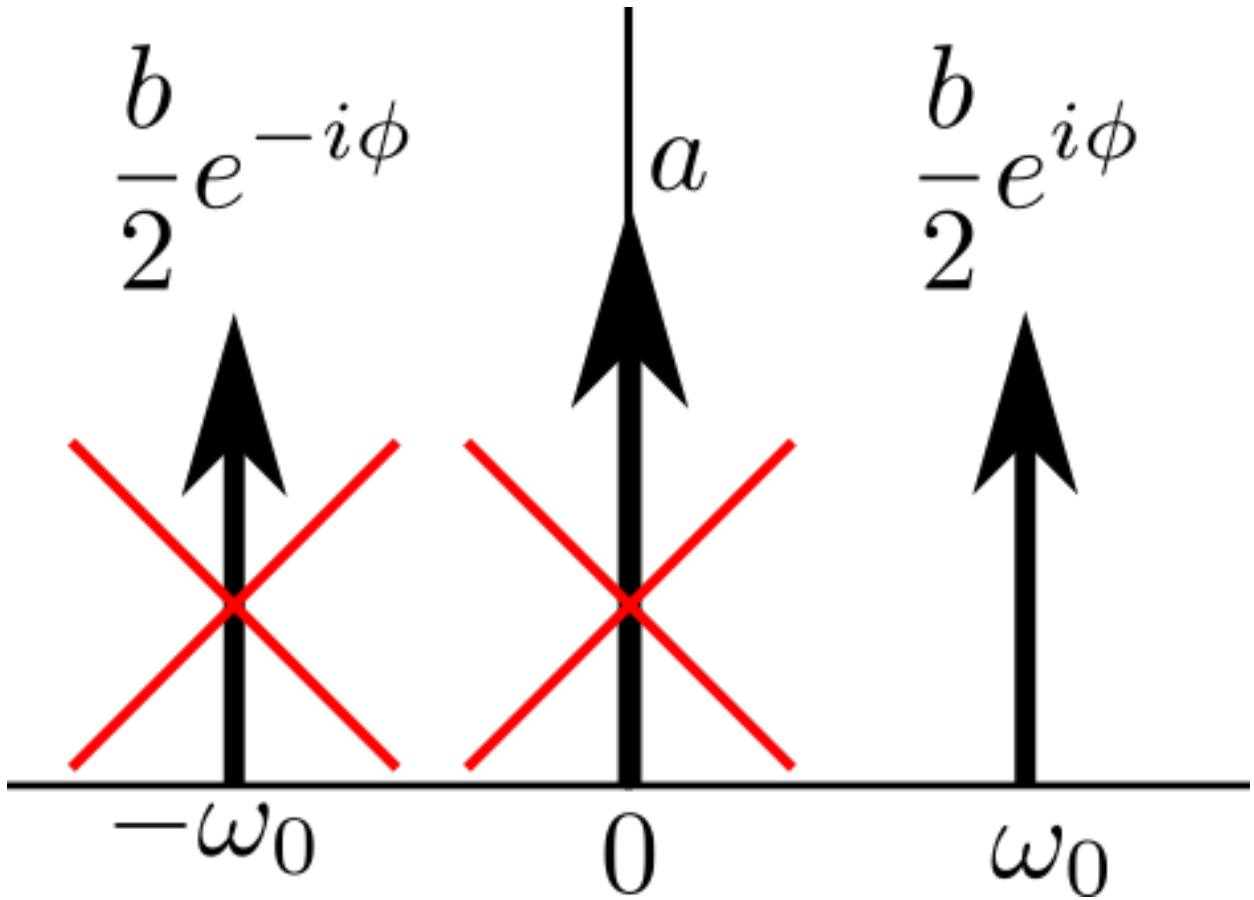
Algoritos de Cuadratura

$$\begin{aligned}\mathcal{F}[I(x,y)] &= I(\omega) \\ &= a\delta(\omega) + \frac{b}{2}e^{-i\phi}\delta(\omega-\omega_0) + \frac{b}{2}e^{i\phi}\delta(\omega+\omega_0) \quad (2)\end{aligned}$$



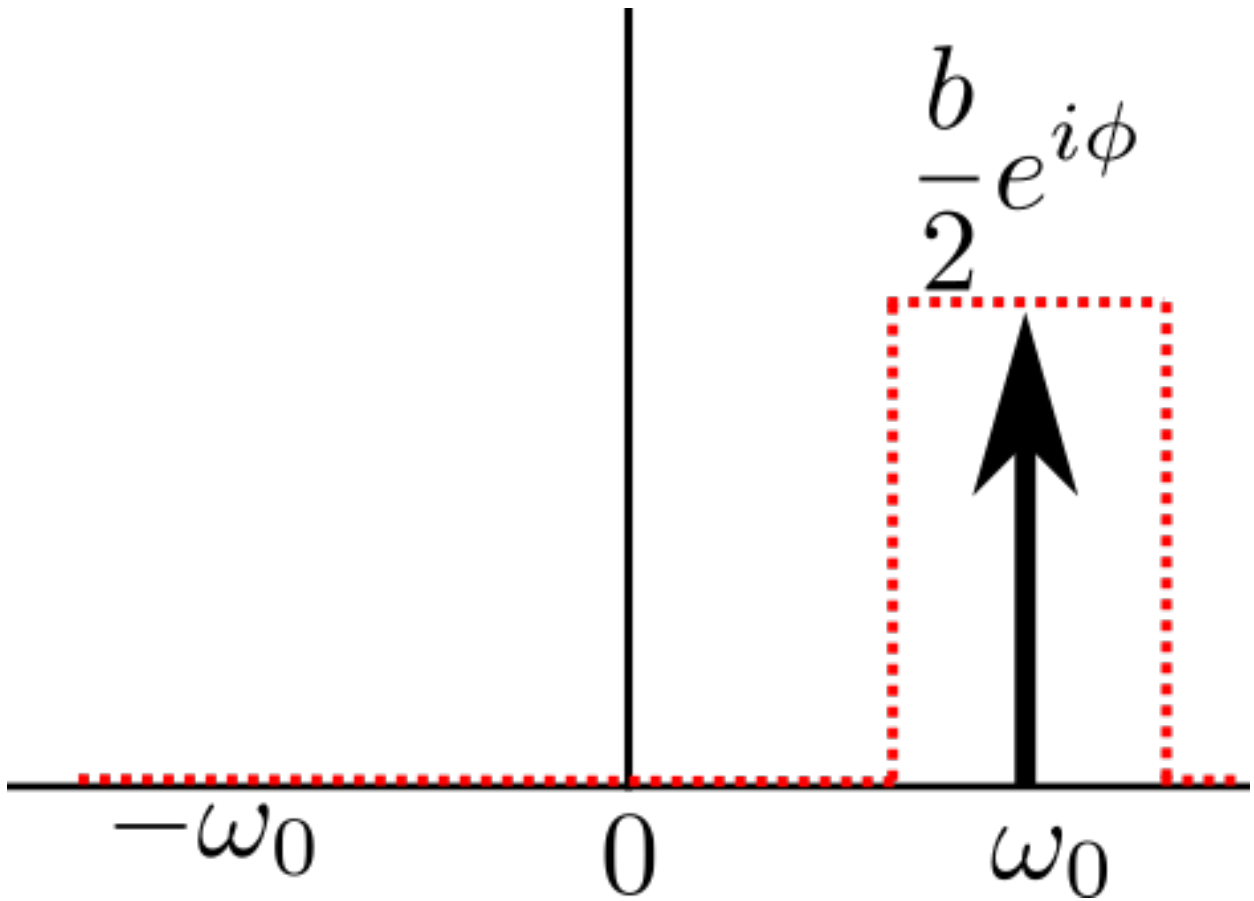
Algoritos de Cuadratura

$$H(-\omega_0) = H(0) = 0, H(\omega_0) \neq 0 \tag{3}$$



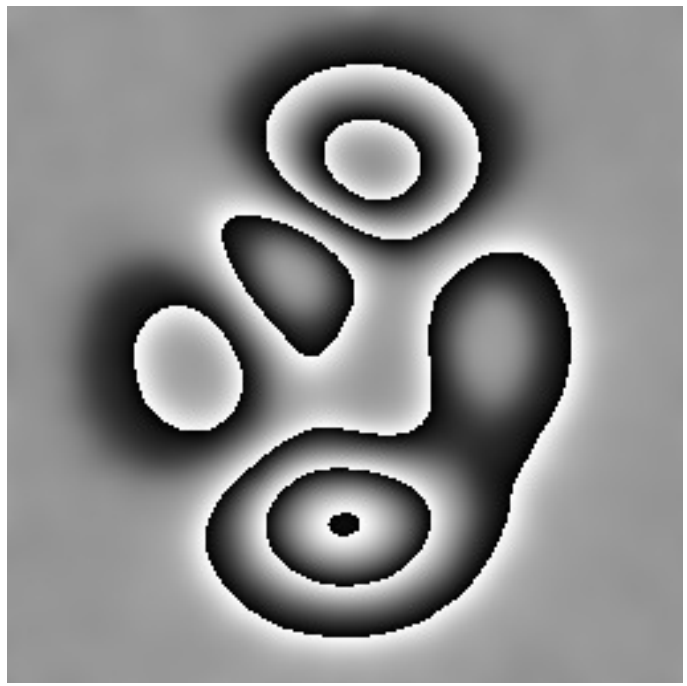
Algoritos de Cuadratura

$$I(\omega)H(\omega) = \frac{b}{2}exp[i\phi] \tag{4}$$



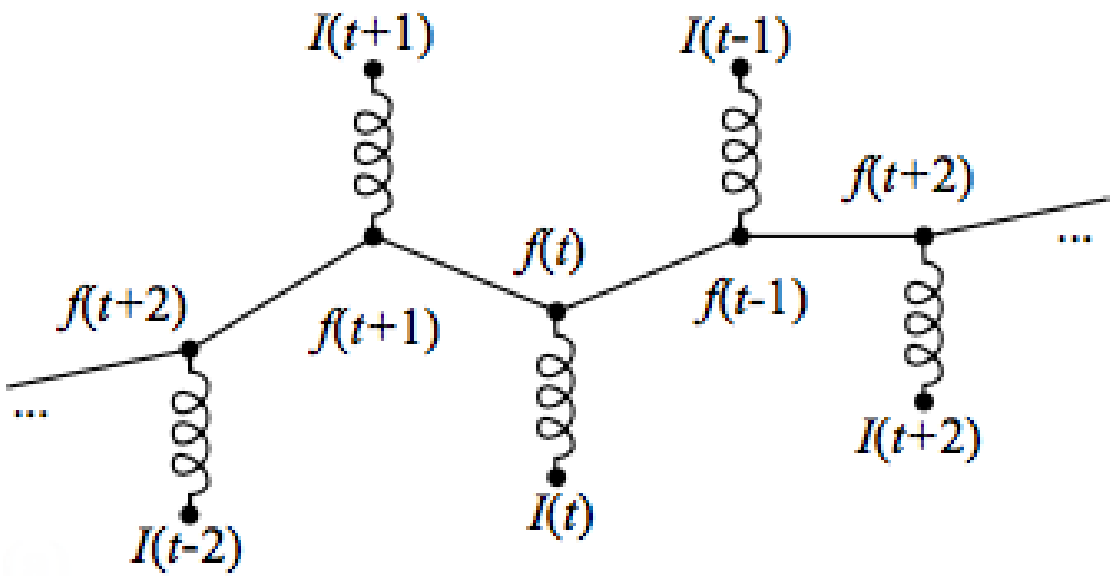
Algoritmos de Cuadratura

$$\hat{\phi} = atan\left[\frac{Im\{\frac{b}{2}exp[i\phi]\}}{Re\{\frac{b}{2}exp[i\phi]\}}\right] \tag{5}$$



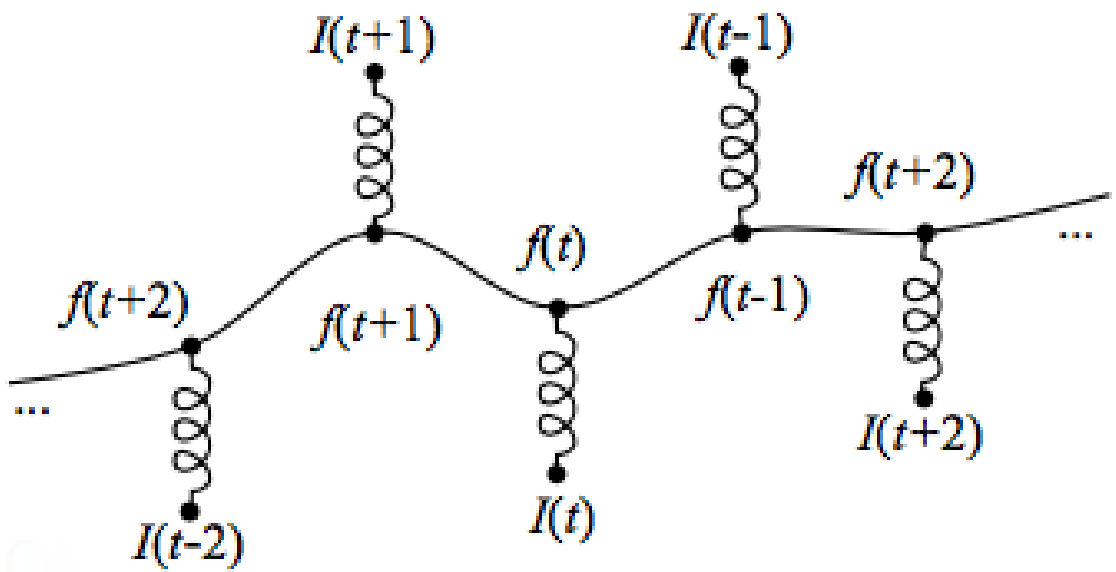
Filtros Regularizados

$$U[f(x,y)] = \iint_{(x,y)\in S} \left\{ [f(x,y) - I(x,y)]^2 + \eta \left[\frac{\partial^2 f(x,y)}{\partial x^2} \right]^2 + \eta \left[\frac{\partial^2 f(x,y)}{\partial y^2} \right]^2 \right\} dxdy \quad (6)$$



Filtros Regularizados

$$U[f(x,y)] = \iint_{(x,y)\in S} \left\{ [f(x,y) - I(x,y)]^2 + \eta \left[\frac{\partial^2 f(x,y)}{\partial x^2} \right]^2 + \eta \left[\frac{\partial^2 f(x,y)}{\partial y^2} \right]^2 + \eta \left[\frac{\partial^2 f(x,y)}{\partial x \partial y} \right]^2 \right\} dxdy \quad (7)$$



Filtros Regularizados

$$U[f(x,y)] = \sum_{(x,y)\in S} \left\{ [f(x,y) - I(x,y)]^2 + \eta R[f(x,y)] \right\} \qquad (8)$$

Resorte:

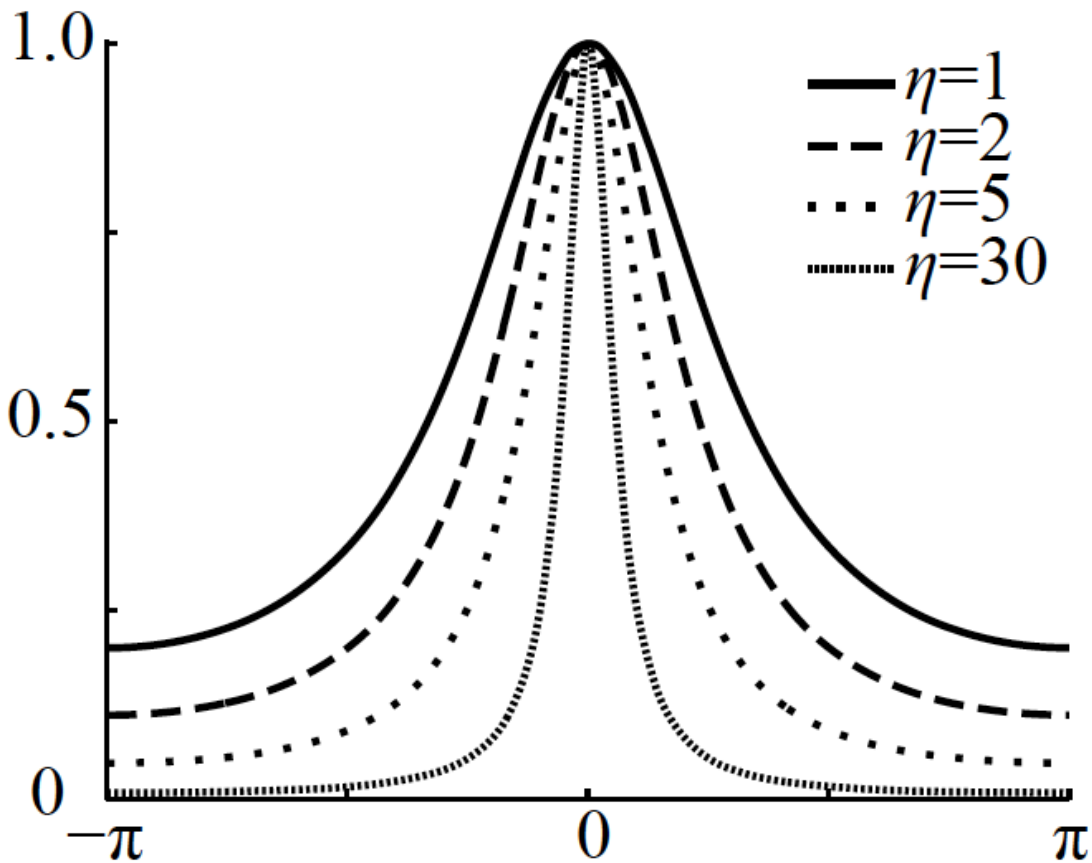
$$R_r[f(x,y)] = [f(x,y) - f(x-1,y)]^2 + [f(x,y) - f(x,y-1)]^2 \qquad (9)$$

Placa:

$$\begin{aligned} R_p[f(x,y)] \quad = \quad & [f(x+1,y) - 2f(x,y) - f(x-1,y)]^2 \\ & + [f(x,y+1) - 2f(x,y) - f(x,y-1)]^2 \\ & + [f(x+1,y+1) - f(x-1,y-1) \\ & + f(x-1,y+1) - f(x+1,y-1)]^2 \qquad (10) \end{aligned}$$

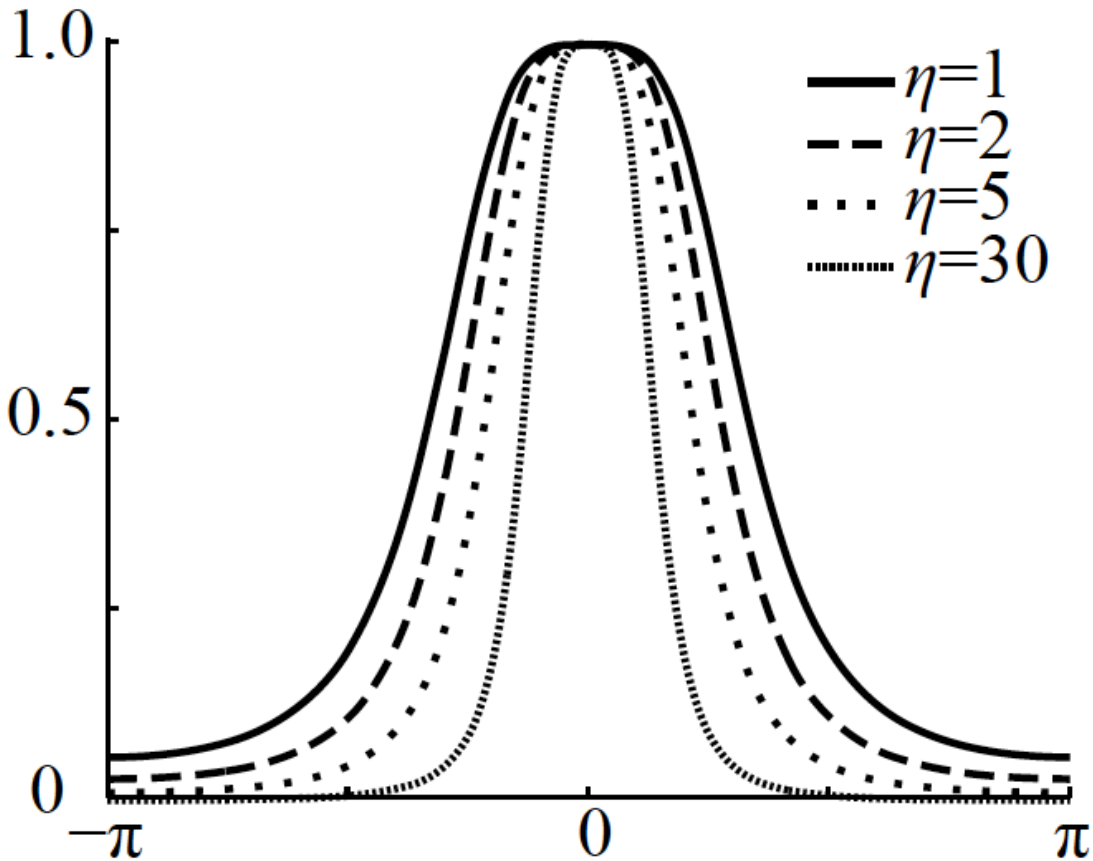
Filtros Regularizados

Resorte:



Filtros Regularizados

Placa:



Filtros Regularizados