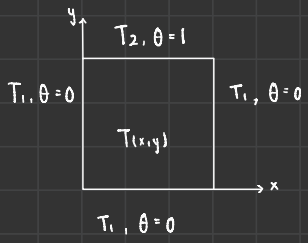
# Bidimensional heat equation




La distribución de temperatura

$$\theta = \frac{T - T_1}{T_2 - T_1} = \frac{2}{\pi} \sum_{n=1}^{\infty} \frac{(-1)^{n+1} + 1}{n} \sin\left(\frac{n\pi x}{L}\right) \frac{\sinh(n\pi y/L)}{\sinh(n\pi W/L)}$$

$$\theta = C_n \sin\left(\frac{n\pi x}{L}\right) \sinh\left(\frac{n\pi y}{L}\right) \quad , \quad C_n = \frac{2}{\pi} \sum_{n=1}^{\infty} \frac{(-1)^{n+1} + 1}{n \sin\left(\frac{n\pi W}{L}\right)}$$

El flujo de calor usando la ley de Fourier

$$\vec{q} = -k \nabla T = -k \left( \frac{\partial \theta}{\partial x} + \frac{\partial \theta}{\partial y} \right)$$

$$\vec{q} = -k C_n \left[ \frac{\partial}{\partial x} \left( \sin\left(\frac{n\pi x}{L}\right) \sinh\left(\frac{n\pi y}{L}\right) \right) + \frac{\partial}{\partial y} \left( \sin\left(\frac{n\pi x}{L}\right) \sinh\left(\frac{n\pi y}{L}\right) \right) \right]$$

$$\vec{q} = -k \frac{C_n}{L \sinh\left(\frac{\pi W n}{L}\right)} \left[ \cos(n\pi x/L) \sinh(n\pi y/L) + \sin\left(\frac{\pi n x}{L}\right) \cosh\left(\frac{n\pi y}{L}\right) \right]$$