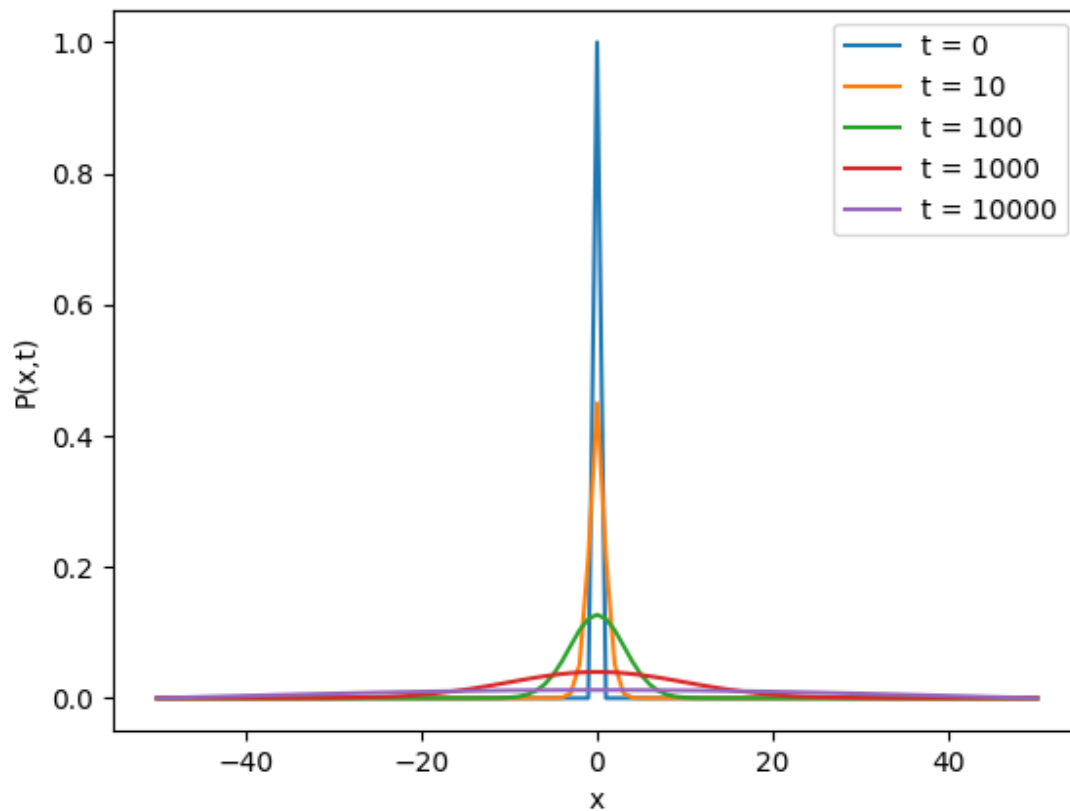


Numerical Solution of Diffusion Equation

1. 1D Diffusion equation

$$\frac{\partial P(x,t)}{\partial t} = D \cdot \frac{\partial^2 P(x,t)}{\partial x^2}$$

The plot of P vs x for different times is given below:
(Taking L = 50, D = 0.5, delta_t = 0.1)



2. 2D Diffusion equation

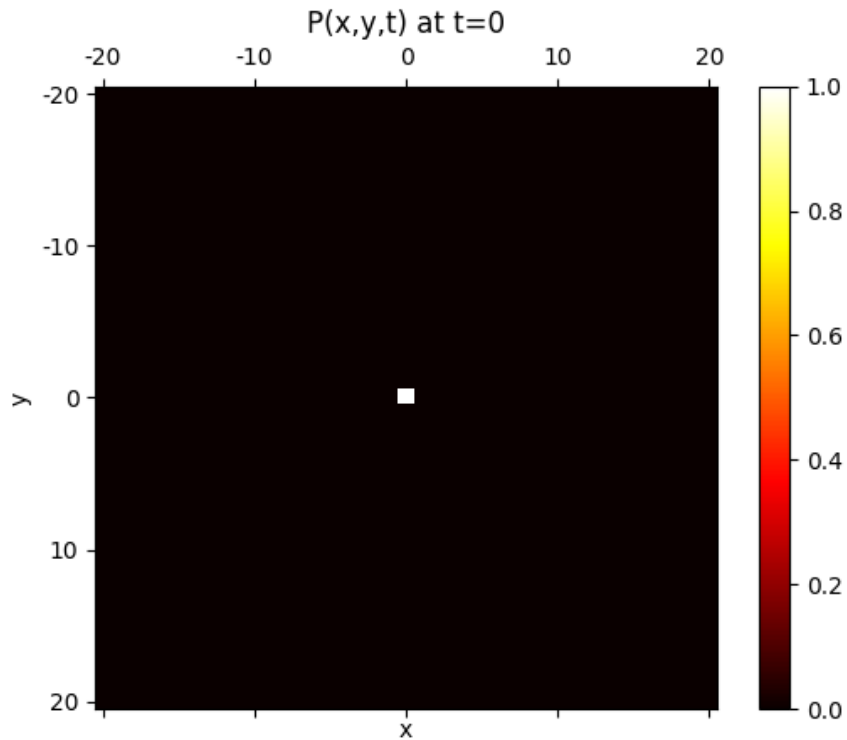
$$\frac{\partial P(x,y,t)}{\partial t} = D_x \cdot \frac{\partial^2 P(x,y,t)}{\partial x^2} + D_y \cdot \frac{\partial^2 P(x,y,t)}{\partial y^2}$$

All the following cases are simulated with $L = 20$, $\Delta t = 0.1$

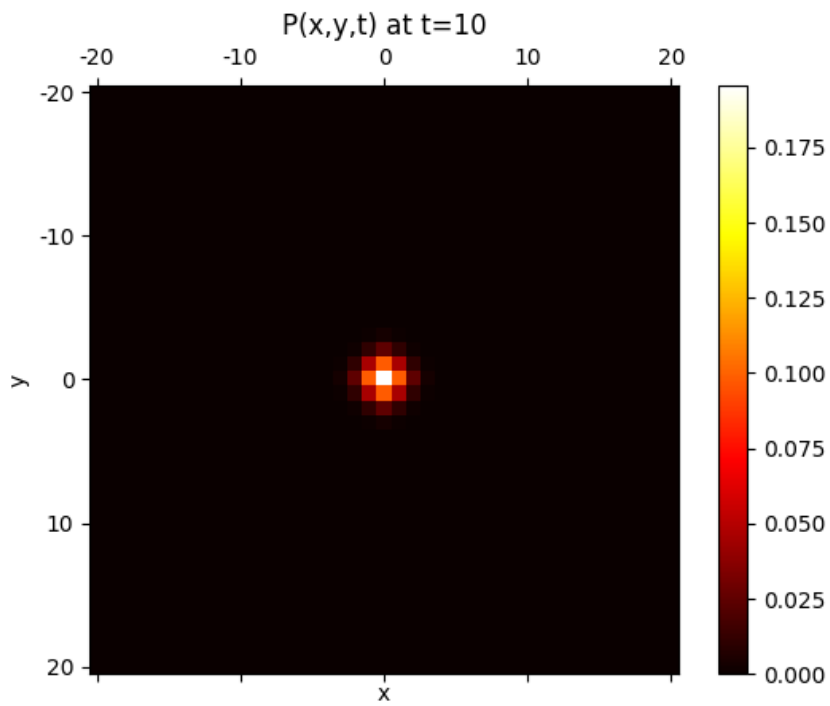
Case I: $D_x = D_y$

$D_x = D_y = 0.5$

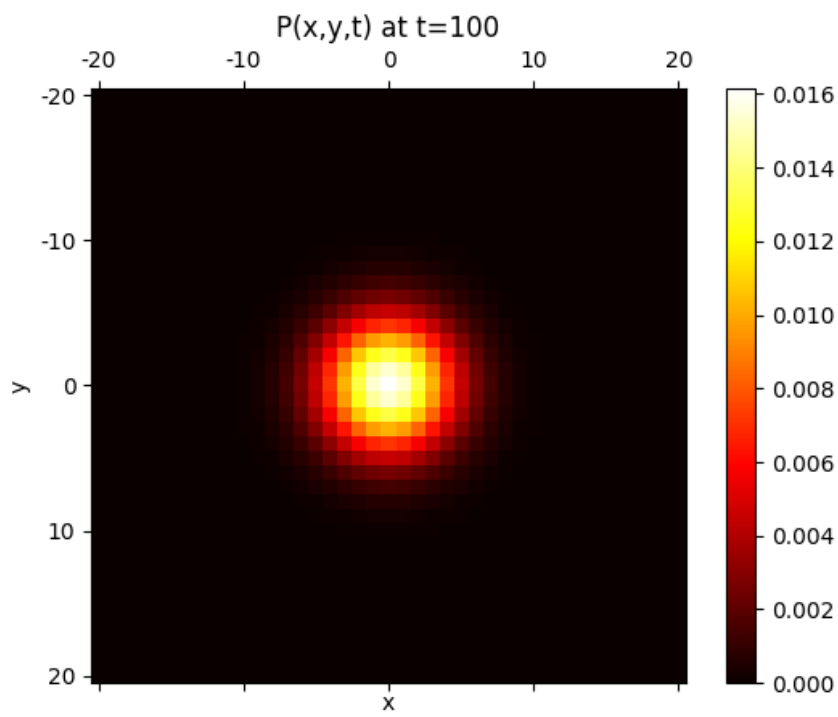
At $n = 0$



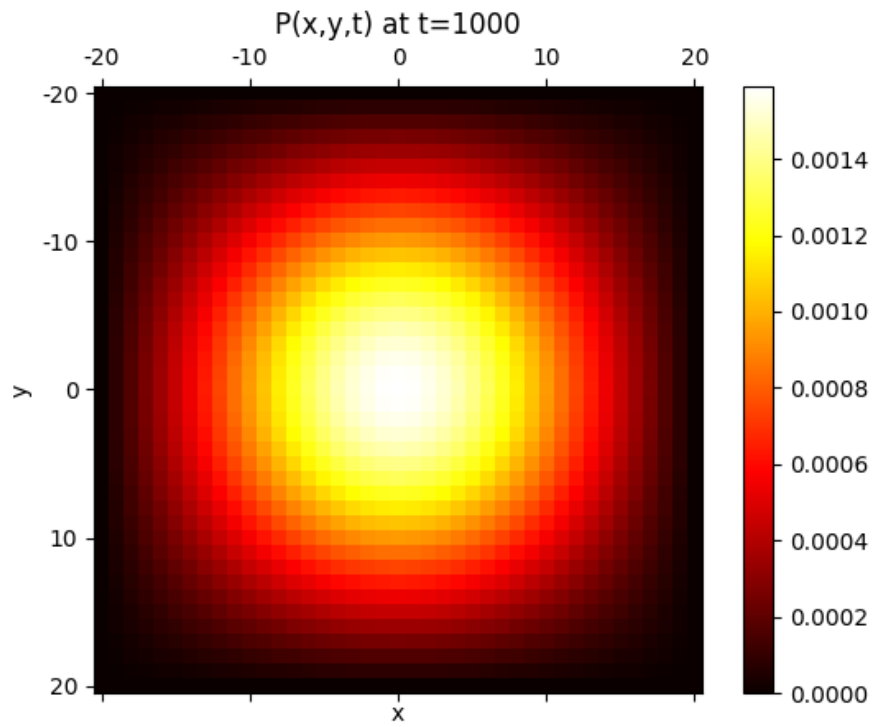
At $n = 10$



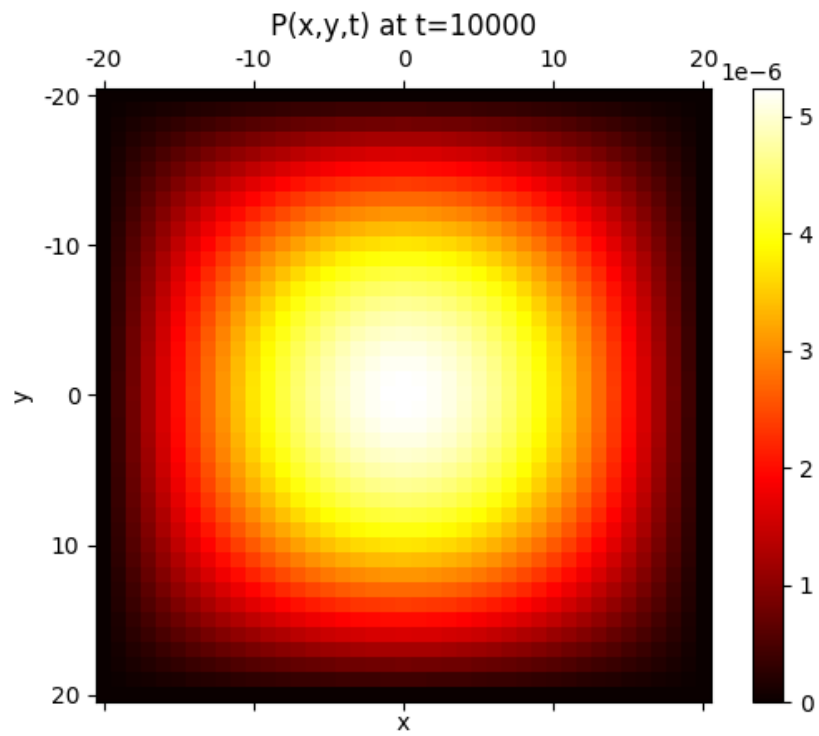
At $n = 100$



At $n = 1000$



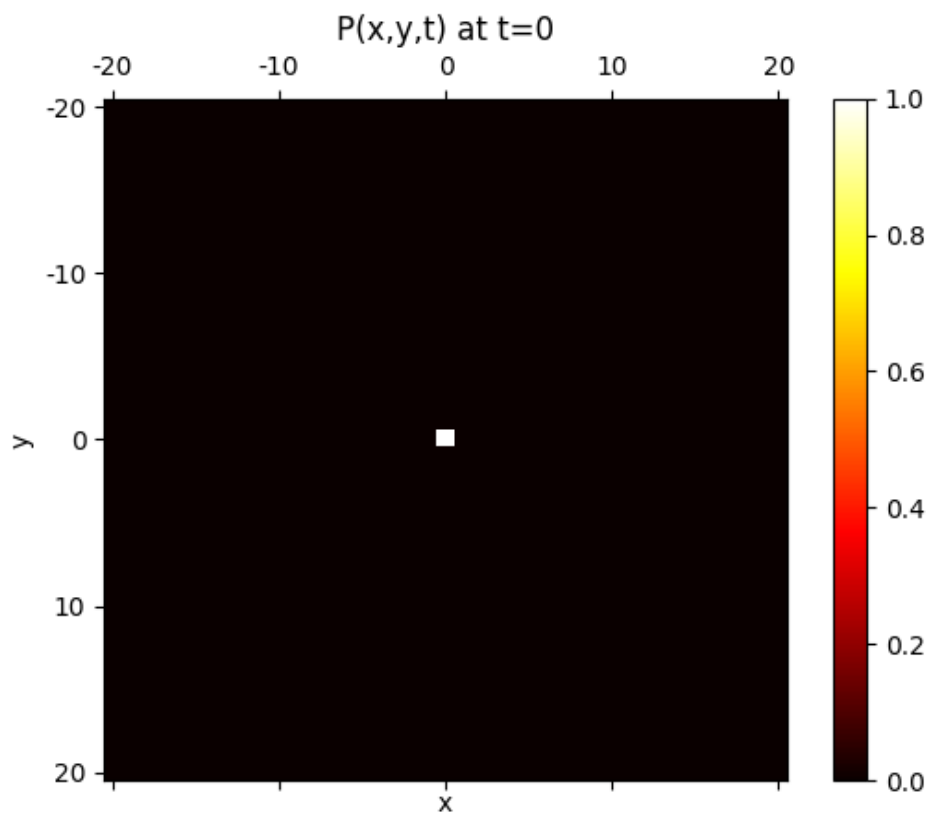
At $n = 10000$



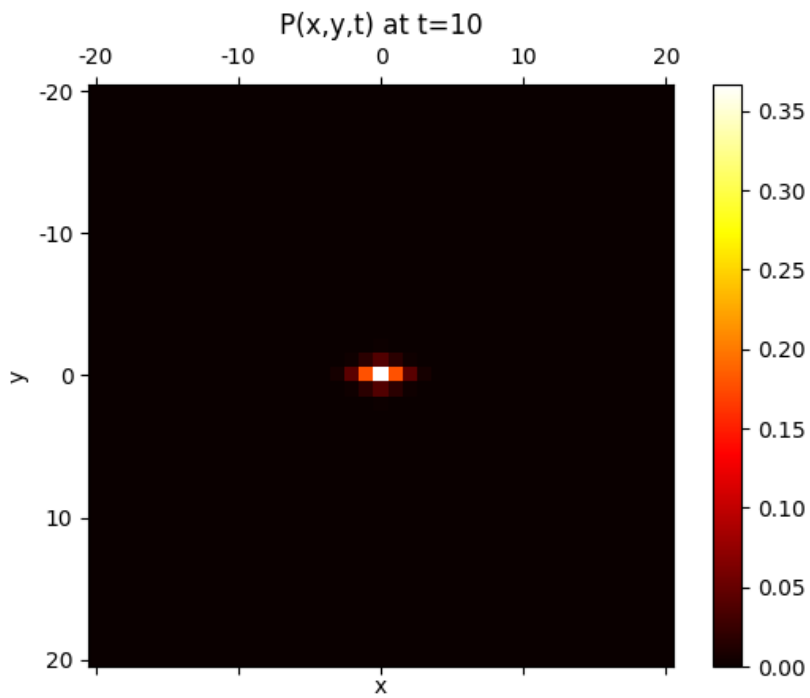
Case II: $Dx > Dy$

$Dx = 0.5, Dy = 0.1$

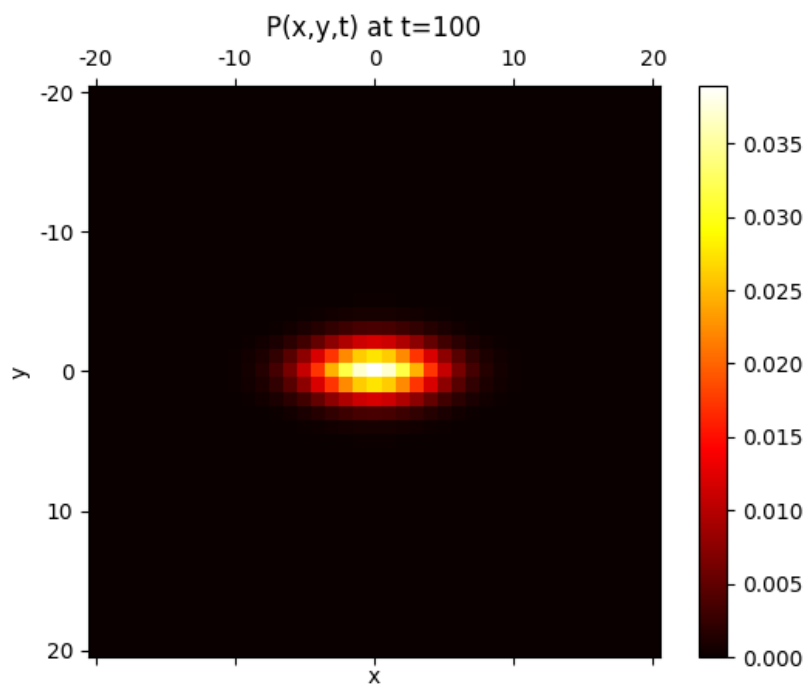
At $n = 0$



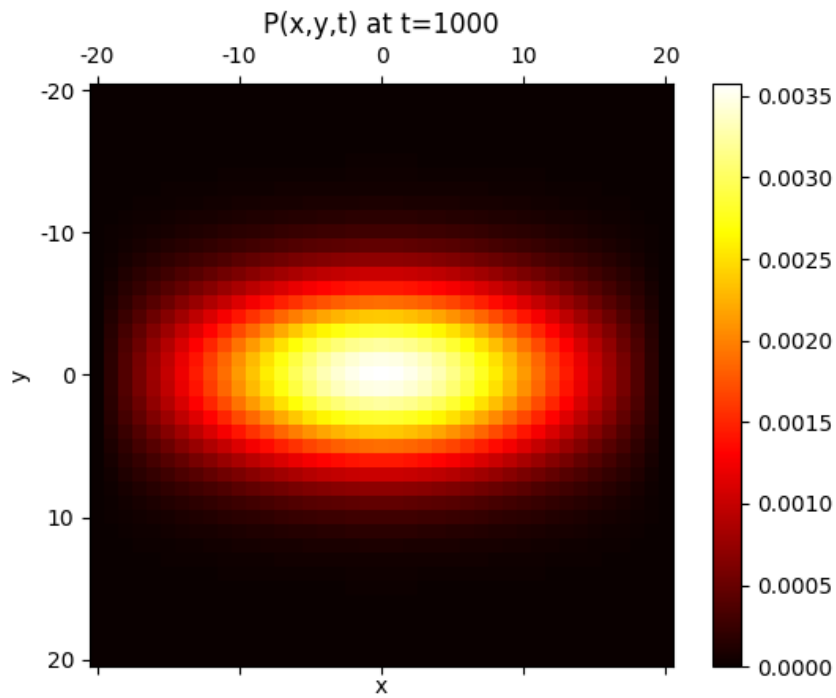
At $n = 10$



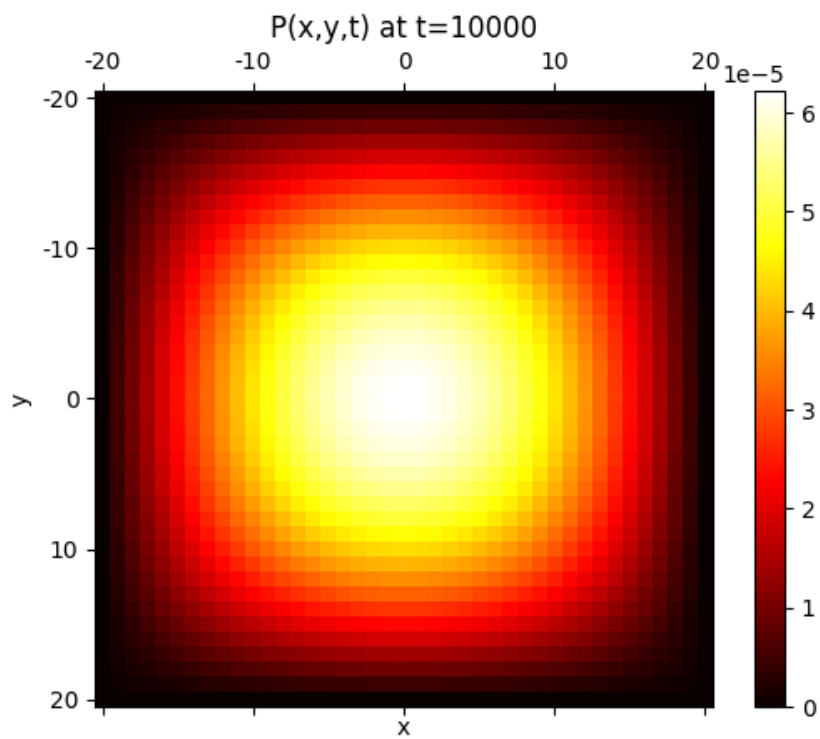
At $n = 100$



At $n = 1000$



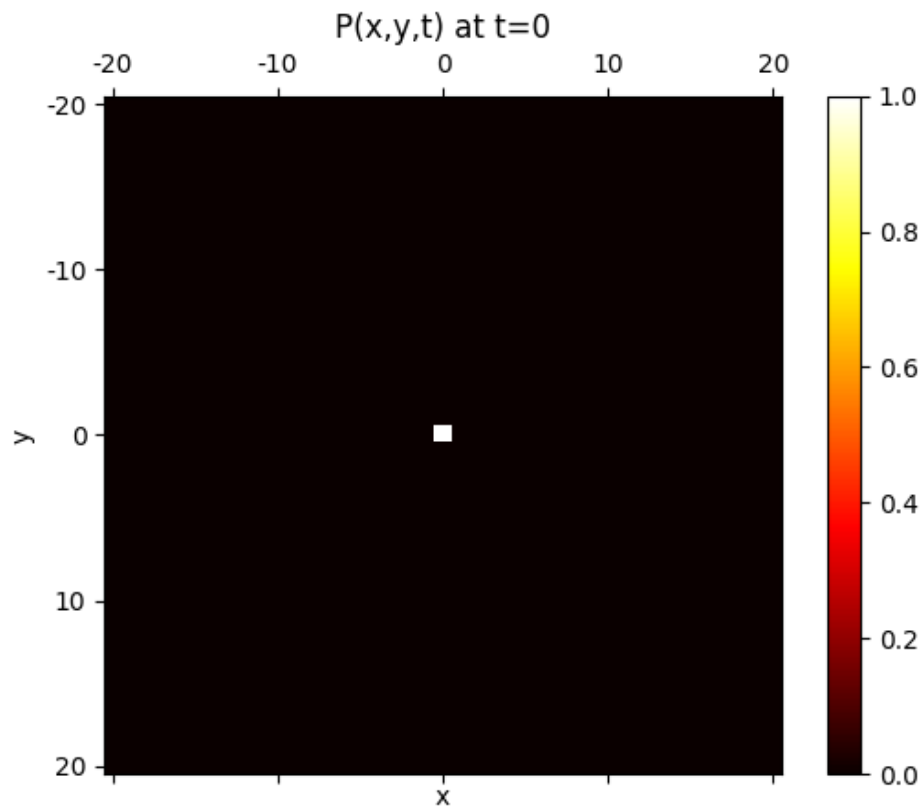
At $n = 10000$



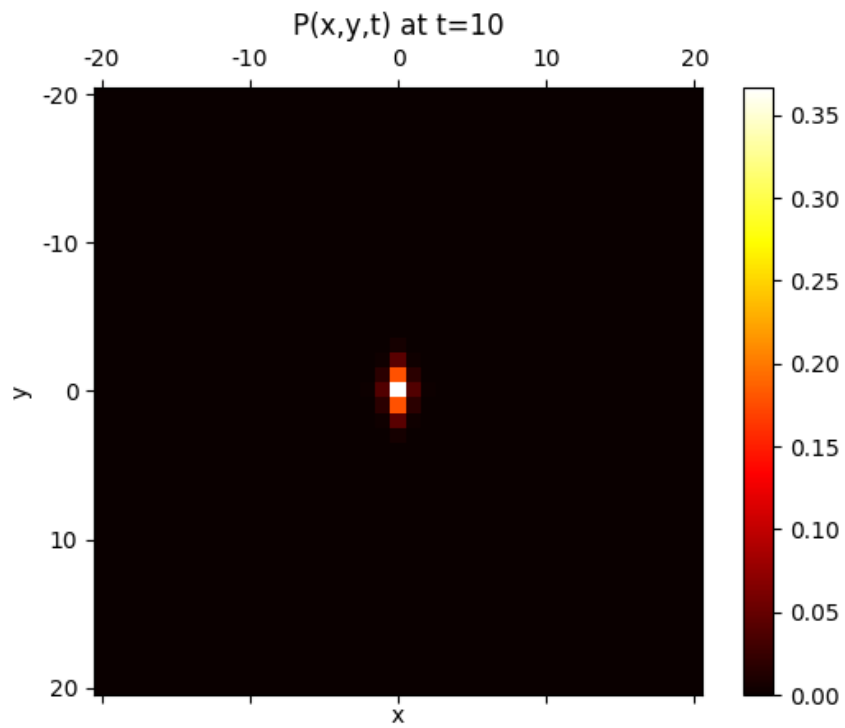
Case III: $Dx < Dy$

$Dx = 0.1, Dy = 0.5$

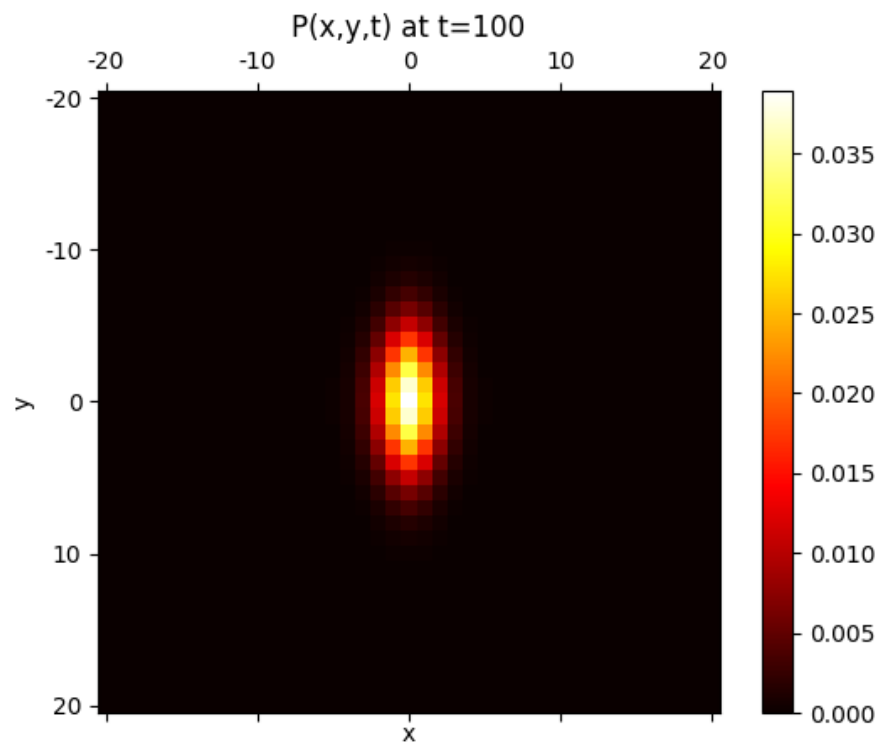
At $n = 0$



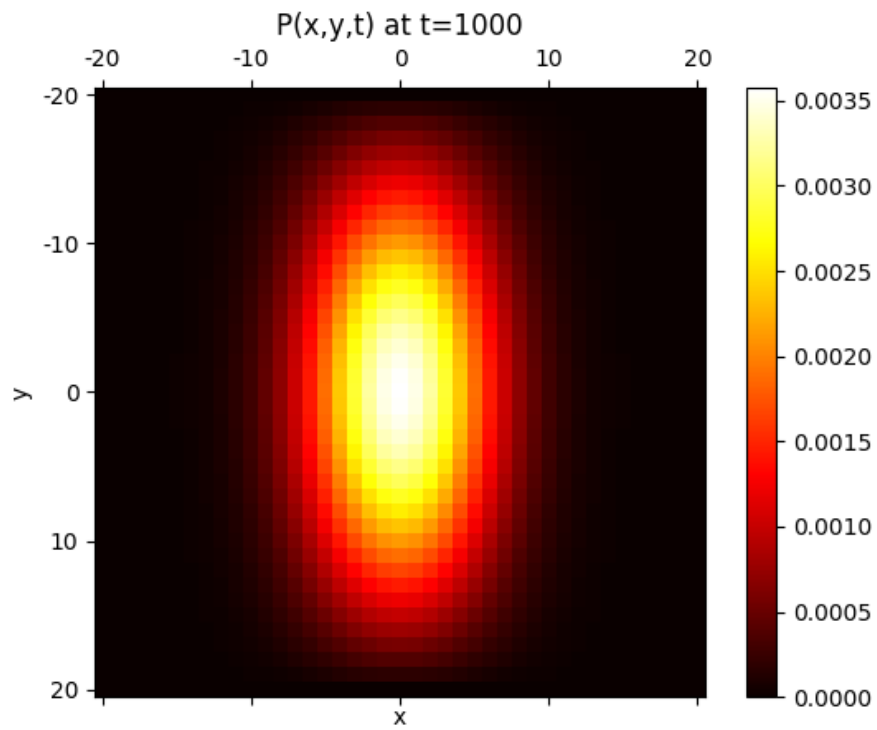
At $n = 10$



At $n = 100$



At $n = 1000$



At $n = 10000$

