$$\frac{\partial^{2} P}{\partial x^{2}} = \frac{\partial^{2} P}{\partial x^{2}}$$

$$\frac{\partial^{2} P}{\partial x^{2}} \approx \frac{\frac{\partial^{2} P}{\partial x}|_{x_{i+1}} - \frac{\partial^{2} P}{\partial x}|_{x_{i+1}}}{2\Delta x}$$

$$= \frac{P(x_i) - P(x_{i-1})}{\Delta x} + \frac{P(x_{i+1}) - P(x_i)}{\Delta x}$$

$$= \frac{P(x_{i+1}) - 2P(x_i) + P(x_{i-1})}{\omega x^2}$$

T.S.
$$P(x+\Delta x) = P(x) + \frac{\partial P}{\partial x} |_{x}^{\Delta x} + \frac{1}{2!} \frac{\partial^{2} P}{\partial x^{2}} |_{x}^{\Delta x^{2}} + \frac{1}{3!} \frac{\partial^{3} P}{\partial x^{3}} |_{x}^{\Delta x^{3}} + \cdots + \frac{1}{4!} \frac{\partial^{2} P}{\partial x^{2}} |_{x}^{\Delta x^{2}} + \frac{1}{3!} \frac{\partial^{2} P}{\partial x^{3}} |_{x}^{\Delta x^{3}} + \cdots + \frac{1}{4!} \frac{\partial^{2} P}{\partial x^{2}} |_{x}^{\Delta x^{2}} + \frac{1}{3!} \frac{\partial^{2} P}{\partial x^{3}} |_{x}^{\Delta x^{3}} + \cdots + \frac{1}{4!} \frac{\partial^{2} P}{\partial x^{2}} |_{x}^{\Delta x^{2}} + \frac{1}{3!} \frac{\partial^{2} P}{\partial x^{3}} |_{x}^{\Delta x^{3}} + \cdots + \frac{1}{4!} \frac{\partial^{2} P}{\partial x^{2}} |_{x}^{\Delta x^{2}} + \frac{1}{3!} \frac{\partial^{2} P}{\partial x^{3}} |_{x}^{\Delta x^{3}} + \cdots + \frac{1}{4!} \frac{\partial^{2} P}{\partial x^{2}} |_{x}^{\Delta x^{2}} + \frac{1}{3!} \frac{\partial^{2} P}{\partial x^{3}} |_{x}^{\Delta x^{3}} + \cdots + \frac{1}{4!} \frac{\partial^{2} P}{\partial x^{2}} |_{x}^{\Delta x^{2}} + \frac{1}{3!} \frac{\partial^{2} P}{\partial x^{3}} |_{x}^{\Delta x^{3}} + \cdots + \frac{1}{4!} \frac{\partial^{2} P}{\partial x^{2}} |_{x}^{\Delta x^{2}} + \frac{1}{3!} \frac{\partial^{2} P}{\partial x^{3}} |_{x}^{\Delta x^{3}} + \cdots + \frac{1}{4!} \frac{\partial^{2} P}{\partial x^{2}} |_{x}^{\Delta x^{2}} + \frac{1}{3!} \frac{\partial^{2} P}{\partial x^{3}} |_{x}^{\Delta x^{3}} + \cdots + \frac{1}{4!} \frac{\partial^{2} P}{\partial x^{2}} |_{x}^{\Delta x^{2}} + \frac{1}{3!} \frac{\partial^{2} P}{\partial x^{3}} |_{x}^{\Delta x^{3}} + \cdots + \frac{1}{4!} \frac{\partial^{2} P}{\partial x^{2}} |_{x}^{\Delta x^{2}} + \frac{1}{3!} \frac{\partial^{2} P}{\partial x^{3}} |_{x}^{\Delta x^{3}} + \cdots + \frac{1}{4!} \frac{\partial^{2} P}{\partial x^{2}} |_{x}^{\Delta x^{2}} + \frac{1}{3!} \frac{\partial^{2} P}{\partial x^{3}} |_{x}^{\Delta x^{3}} + \cdots + \frac{1}{4!} \frac{\partial^{2} P}{\partial x^{2}} |_{x}^{\Delta x^{3}} + \cdots + \frac{1}{4!} \frac{\partial^{2} P}{\partial x^{3}} |_{x}^{\Delta x^{3}} + \cdots + \frac{1}{4!} \frac{\partial^{2} P}{\partial x^{3}} |_{x}^{\Delta x^{3}} + \cdots + \frac{1}{4!} \frac{\partial^{2} P}{\partial x^{3}} |_{x}^{\Delta x^{3}} + \cdots + \frac{1}{4!} \frac{\partial^{2} P}{\partial x^{3}} |_{x}^{\Delta x^{3}} + \cdots + \frac{1}{4!} \frac{\partial^{2} P}{\partial x^{3}} |_{x}^{\Delta x^{3}} + \cdots + \frac{1}{4!} \frac{\partial^{2} P}{\partial x^{3}} |_{x}^{\Delta x^{3}} + \cdots + \frac{1}{4!} \frac{\partial^{2} P}{\partial x^{3}} |_{x}^{\Delta x^{3}} + \cdots + \frac{1}{4!} \frac{\partial^{2} P}{\partial x^{3}} |_{x}^{\Delta x^{3}} + \cdots + \frac{1}{4!} \frac{\partial^{2} P}{\partial x^{3}} |_{x}^{\Delta x^{3}} + \cdots + \frac{1}{4!} \frac{\partial^{2} P}{\partial x^{3}} |_{x}^{\Delta x^{3}} + \cdots + \frac{1}{4!} \frac{\partial^{2} P}{\partial x^{3}} |_{x}^{\Delta x^{3}} + \cdots + \frac{1}{4!} \frac{\partial^{2} P}{\partial x^{3}} |_{x}^{\Delta x^{3}} + \cdots + \frac{1}{4!} \frac{\partial^{2} P}{\partial x^{3}} |_{x}^{\Delta x^{3}} + \cdots + \frac{1}{4!} \frac{\partial^{2} P}{\partial x^{3}} |_{x}^{\Delta x^{3}} + \cdots + \frac{1}{4!} \frac{\partial^{2} P}{\partial x^{3}} |_{x}^{\Delta x^{3}} + \cdots + \frac{1$$

$$P(x + \Delta x) + P(x - \Delta x) = 2P(x) + \frac{2^{2}P}{2x^{2}} (\Delta x)^{2} + \frac{2}{4!} \frac{2^{4}P}{2x^{2}} (\Delta x)^{4} + \dots$$

$$\frac{2^{2}P}{2x^{2}} = \frac{P(x + \Delta x) - 2P(x) + P(x - \Delta x)}{\Delta x^{2}} + O(|\Delta x|^{2})$$

$$\frac{\partial^2 P}{\partial x^2} = \frac{1}{\alpha} \frac{\partial P}{\partial t}$$
For the "ith" grid block
$$\frac{\partial^2 P}{\partial x^2} = \frac{1}{\alpha} \frac{\partial P}{\partial t}$$

$$\frac{\partial P}{\partial x^2} = \frac{\partial P}{\partial t}$$

$$\frac{P_{i-1}^{(n)} - 2P_i^{(n)} + P_{i+1}^{(n)}}{(\Delta \times)^2} = \frac{1}{\alpha} \left( \frac{P_i^{n+1} - P_i^n}{\Delta t} \right) \xrightarrow{\text{Explict}}$$

$$P^{n+1} = \alpha \Delta t \left[ \frac{P_{i-1}^n - 2P_i^n + P_{i+1}^n}{(\Delta x)^2} \right] + P_i^n$$