①

$$\frac{\partial E_z}{\partial t} = \frac{1}{\varepsilon}\left[\frac{\partial H_y}{\partial x} - \frac{\partial H_x}{\partial y}\right]$$

$$\Rightarrow \frac{E_z{}^{n+1/2}_{i,j} - E_z{}^{n-1/2}_{i,j}}{\Delta t} = \frac{1}{\varepsilon}\left[\left(\frac{H_y{}^{n}_{i,j+1/2} - H_y{}^{n}_{i,j-1/2}}{\Delta x}\right) - \left(\frac{H_x{}^{n}_{i+1/2,j} - H_x{}^{n}_{i-1/2,j}}{\Delta y}\right)\right]$$

$$\Rightarrow E_z{}^{n+1/2}_{i,j} = E_z{}^{n-1/2}_{i,j} - \cancel{\frac{\Delta t}{\varepsilon\cdot\Delta y}\left(H_x{}^{n}_{i+1/2,j} - H_x{}^{n}_{i-1/2,j}\right)}$$
$$+ \frac{\Delta t}{\varepsilon\cdot\Delta x}\left(H_y{}^{n}_{i,j+1/2} - H_y{}^{n}_{i,j+1/2}\right)$$

$$\Rightarrow E_{zx}{}^{n-1/2}_{i,j} = E_{zx}{}^{n-1/2}_{i,y} + \frac{\Delta t}{\varepsilon\cdot\Delta x}\left(H_y{}^{n}_{i,j+1/2} - H_y{}^{n}_{i,j+1/2}\right)$$

$A = 1$; $B = \dfrac{\Delta t}{\varepsilon\cdot\Delta x}$

②

$$E_z{}^{n+1/2}_{i,j} = E_z{}^{n-1/2}_{i,j} - \frac{\Delta t}{\varepsilon\cdot\Delta y}\left(H_x{}^{n}_{i+1/2,j} - H_x{}^{n}_{i-1/2,j}\right)$$
$$+ \cancel{\frac{\Delta t}{\varepsilon\cdot\Delta x}\left(H_y{}^{n}_{i,j+1/2} - H_y{}^{n}_{i,j+1/2}\right)}$$

$$\Rightarrow E_{zy}{}^{n+1/2}_{i,y} = E_{zy}{}^{n-1/2}_{i,y} - \frac{\Delta t}{\varepsilon\cdot\Delta y}\left(H_x{}^{n}_{i+1/2,j} - H_x{}^{n}_{i-1/2,j}\right)$$

$C = 1$; $D = \dfrac{\Delta t}{\varepsilon\cdot\Delta y}$

③ $$\frac{\partial H_x}{\partial t} = \frac{1}{\mu}\left[-\frac{\partial E_z}{\partial y}\right]$$

$$\frac{H_x{}^{n+1/2}_{i-1/2,\,j+1} - H_x{}^{n-1/2}_{i-1/2,\,j+1}}{\Delta t} = -\frac{1}{\mu}\left[\frac{E_z{}^{n}_{i+1/2,\,j} - E_z{}^{n}_{i-1/2,\,j}}{\Delta y}\right]$$

$$\Rightarrow H_x{}^{n+1/2}_{i-1/2,\,j+1} = H_x{}^{n-1/2}_{i-1/2,\,j+1} - \frac{\Delta t}{\mu\cdot\Delta y}\left(E_z{}^{n}_{i+1/2,\,j} - E_z{}^{n}_{i-1/2,\,j}\right)$$

$E = 1;\quad F = \dfrac{\Delta t}{\mu\cdot\Delta y}$

④ $$\frac{\partial H_x}{\partial t} = \frac{1}{\mu}\left[\frac{\partial E_z}{\partial y}\right]$$

$$\frac{H_y{}^{n+1/2}_{i,\,y} - H_y{}^{n-1/2}_{i,\,y}}{\Delta t} = \frac{1}{\mu}\left[\frac{E_z{}^{n}_{i,\,j+1/2} - E_z{}^{n}_{i,\,j-1/2}}{\Delta x}\right]$$

$$\Rightarrow H_y{}^{n+1/2}_{i,j} = H_y{}^{n-1/2}_{i,j} - \frac{\Delta t}{\mu\cdot\Delta x}\left(E_z{}^{n}_{i,\,j+1/2} - E_z{}^{n}_{i,\,j-1/2}\right)$$

$E = 1;\quad F = \dfrac{\Delta t}{\mu\cdot\Delta x}$