The boundary condition $\phi = 0$ specifies ϕ

$\Rightarrow$ Dirichlet boundary condition

3. $\underline{E} = -\nabla\phi = -\left(\frac{\partial}{\partial x}\phi\,\hat{x} + \frac{\partial}{\partial y}\phi\,\hat{y} + \frac{\partial}{\partial z}\phi\,\hat{z}\right)$

where $\frac{\partial\phi}{\partial x} \simeq \frac{\phi(i+1;n) - \phi(i-1;n)}{2}$

~~where x position is index~~ at position i in x direction, at time-step n.

similar ~~same~~ for $\frac{\partial\phi}{\partial y}$ and $\frac{\partial\phi}{\partial z}$

4. error $= \sum_{\substack{\text{lattice} \\ i,j}} |\phi(i,j,k;n+1) - \phi(i,j,k;n)| <$ threshold

When error < threshold (usually 0.01 or 10^{-3}) we have reached steady state

i.e. $\frac{\partial\phi}{\partial t} = 0 = \nabla^2\phi + \frac{\rho}{\varepsilon}$

7. F to show agreement with Gauss' Law

8. Translational invariance along ~~the~~ infinite wire in z direction

$\Rightarrow B_z = 0$, $\frac{\partial}{\partial z}A_x = 0$, $\frac{\partial}{\partial z}A_y = 0$

$\Rightarrow \underline{A} = \begin{pmatrix} 0 \\ 0 \\ A_z(x,y) \end{pmatrix}$ as $\underline{B} = \nabla \times \underline{A}$

$A_z = 0$ at boundaries