2024 L2

1/17/2024

$\nabla \cdot \vec{E} = \rho/\epsilon_0$ ↙ What's this? — Gauss

$\nabla \cdot \vec{B} = 0$ ↙ This — No Monopoles

$\nabla \times \vec{E} = -\frac{\partial \vec{B}}{\partial t}$ — Faraday

$\nabla \times \vec{B} = \mu \vec{J} + \mu \epsilon \frac{\partial \vec{E}}{\partial t}$ — Ampere/Maxwell

Scramble the names

A) Faraday
B) No Monopole
C) Gauss
D) Ampere

Getting to know you
What do you want

Convert Gauss to Integral

$$\int_V \nabla \cdot \underline{E} \, d\tau = \int_V \rho/\epsilon_0 \, d\tau \rightarrow \frac{Q}{\epsilon_0}$$

$\iiint$ dxdydz $\int \nabla \cdot \vec{E} \, d\tau = \oint \vec{E} \cdot d\vec{a}$ What's this called? (p31 of book)

$\int \nabla \cdot \vec{B} \, d\tau = \oint \vec{B} \cdot d\vec{a} = 0$

∘ Closed surface
Closed loop

$\iint$ dxdydz $\int (\nabla \times \vec{E}) \cdot d\vec{a} = -\int \frac{\partial \vec{B}}{\partial t} \cdot d\vec{a}$

$\rightarrow \oint \vec{E} \cdot d\vec{l}$ $\quad \rightarrow \frac{d}{dt} \Phi_B$

$\rightarrow \mathcal{E}$

Called $\mathcal{E}$ because it's not $-\int \vec{E} \cdot d\vec{l}$

[Post Reading This afternoon]

Which of these can't be a magnetic field?
electric

I A Diver $\neq 0$ curl $= 0$ Both

B DIV $= 0$ curl $\neq 0$ Neither

Which of These Can Be Electrostatic?

II C DIV $= 0$ curl $= 0$

D DIV $\neq 0$ curl $\neq 0$

III E DIV $= 0$ curl $\neq 0$

F DIV $\neq 0$ curl $\neq 0$

Which can be electrodynamic