Maxwell equation in differential and integral form →

1. $\vec{\nabla}\cdot\vec{D} = \rho$, $\vec{\nabla}\cdot E = \frac{\rho}{\epsilon_0}$ Gauss law of electrostatics here $D = \epsilon_0 E$

D = Displacement density and

ρ = volume charge density

Integral form →

$$\vec{\nabla}\cdot\vec{D} = \rho$$

Taking volume integral

$$\int \vec{\nabla}\cdot\vec{D}\,dV = \int_V \rho\,dV$$

by Gauss divergence theorem

$\int_V \vec{\nabla}\cdot\vec{D}\,dV$ can be written as -

$$\int_S D\cdot ds$$

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$$\boxed{\int_S D\cdot ds = \int_V \rho\,dV = q}$$

2) $\vec{\nabla}\cdot B = 0$ Gauss law for magnatostatic here

2010	AUGUST				
Mon	30	2	9	16	23
Tue	31	3	10	17	24
Wed		4	11	18	25
Thu		5	12	19	26
Fri		6	13	20	27
Sat		7	14	21	28
Sun	1	8	15	22	29

B = Magnetic field / M.F density

Integral form →

$$\vec{\nabla} \cdot B = 0$$

Taking volume integral

$$\int_V \vec{\nabla} \cdot B \, dV = 0$$

By Gauss divergence theorem

$$\int_S B \cdot ds = 0$$

we have $B = \mu_0 H$

$$\int_S \mu_0 H ds = 0$$

$$\boxed{\int_S H \, ds = 0}$$

3) $\vec{\nabla} \times \vec{E} = -\frac{\partial \vec{B}}{\partial t}$ Faradays law of electromagnetic here

E = Electric field intensity

Integral Form →

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

Integrating over surface S

OCTOBER				2010	NOVEMBER				
4	11	18	25	Mon	1	8	15	22	29
5	12	19	26	Tue	2	9	16	23	30
6	13	20	27	Wed	3	10	17	24	
7	14	21	28	Thu	4	11	18	25	
1 8	15	22	29	Fri	5	12	19	26	
2 9	16	23	30	Sat	6	13	20	27	

$$\int_S (\vec{\nabla} \times \vec{E}) \cdot d\vec{s} = -\int_S \frac{\partial \vec{B}}{\partial t} \cdot d\vec{s}$$

By stoke's theorem

$\int_S (\vec{\nabla} \times \vec{E}) ds$ can be written as

$$\oint E \cdot dl$$

$$\boxed{\oint E \cdot dl = -\frac{\partial}{\partial t} \int_S \vec{B} \cdot ds}$$

4) $\vec{\nabla} \times H = \vec{J} + \frac{\partial \vec{D}}{\partial t}$ Modified amp. circutial here

h = M·F intensity

J = current density

and $\frac{\partial \vec{D}}{\partial t}$ = Displacement current density

Integral form →

$$\vec{\nabla} \times \vec{H} = \int \vec{J} + \frac{\partial \vec{D}}{\partial t}$$

Integrating over surface S.

2010	AUGUST				
Mon	30	2	9	16	23
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Wed		4	11	18	25
Thu		5	12	19	26
Fri		6	13	20	27
Sat		7	14	21	28
Sun	1	8	15	22	29

2010	SEPTEMBER				
Mon		6	13	20	27
Tue		7	14	21	28
Wed	1	8	15	22	29
Thu	2	9	16	23	30
Fri	3	10	17	24	
Sat	4	11	18	25	
Sun	5	12	19	26	

$$\int_S (\vec{\nabla} \times H)\, ds = \int_S \left(\vec{J} + \frac{\partial D}{\partial t}\right) ds$$

9

By Stokes theorem

10

11

$$\boxed{\oint H \cdot dl = \int_S \left(\vec{J} + \frac{\partial \vec{D}}{\partial t}\right) ds}$$

12

we know $B = \mu_0 H$

13

14

$$\boxed{\oint B \cdot dl = \mu_0 \int_S \left(J + \frac{\partial D}{\partial t}\right) ds}$$

15

— x —