

111 - Maxwells III - Egn > Foraday's Law: θ Ē.dl = - ∫ OB de ⇒ Sntegrad Ot - de ⇒ Form. Applying Stokes Theorem & Relating Line Integral to ? Surface Integral & Vice Versal > TrE = - DR > Differential From. IV -> Moxwell' IV Egn > Modified Amperes Low: Applying Stokes Theorem, Conduction Displacement.

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FORM.

Applying Stokes Theorem, Conduction Displacement.

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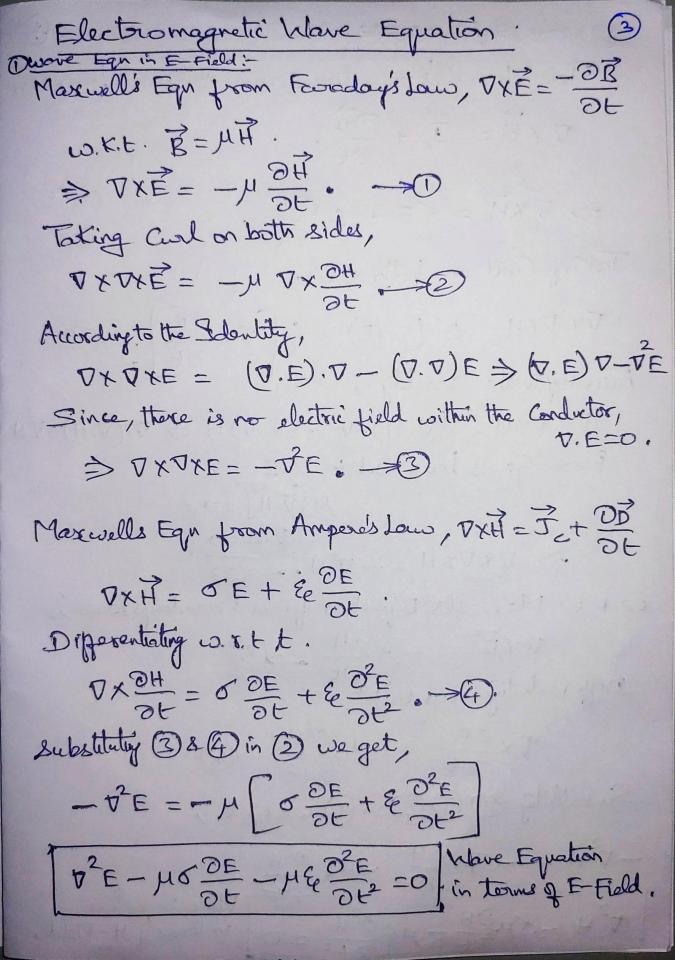
FORM. DXH = JZ + OB => Differential Form. The Magnetomotive force around a closed path is equal to the sum of the Conduction Current & displacement Covort by the path.

Three Constitutive

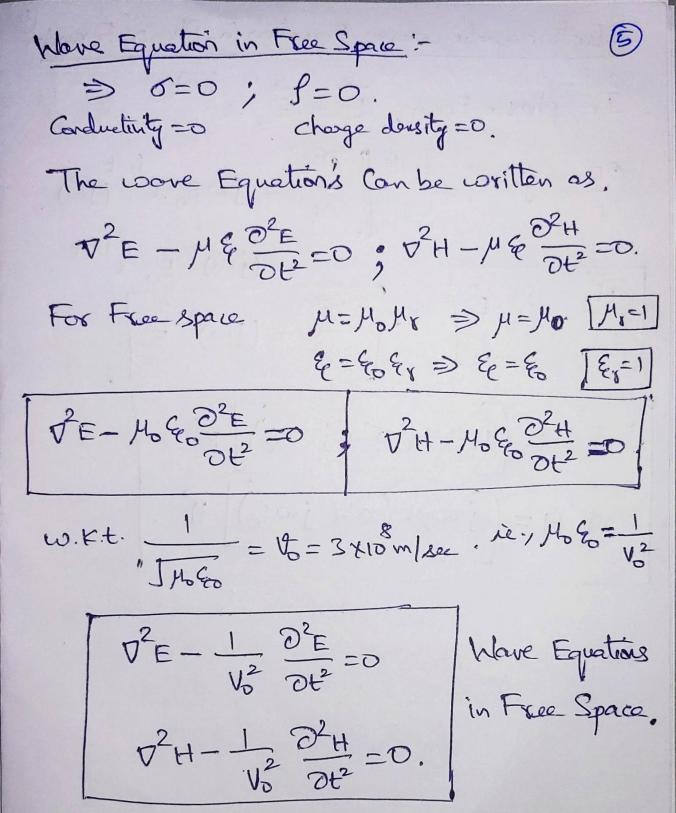
Telations in Field Theory > H-Field = B= HH

Analysis

F= 5 E



2 vouve Equ'in Magnetic field! The Maxwell's equation from Amperes Low is., VXH= J2+OB. > DXH = QE + & DE. Taking auch on both sides, DX DXH = R (DXE) + & DX DE ->0 According to the Sdonlity ., DXDXH = (D.H).D - (D.D) H > D.(D.H)-VH From Gans Low, W.K.t V.B=0. M (7.4) =0. > DXDXH = - DH. -> E W. K.t. Maxwells Equation from Forodays Law is TYE = - MOH 3 Differentiality w.r.t "t". DXOE = -4 OH >@ Substituting D, D, D in D we get ., - 2H = - QH OH - HE OH I Wave Equation in terms of H-Field. 72H - SHOH - HE 2H =0



Electromagnetic wave Equation in Phasor Form: In phasor Form, $\vec{E} = \vec{E}_{B} e^{-i\omega t}$ $\frac{\partial E}{\partial t} = j\omega \vec{E}_{e} e^{j\omega t} = j\omega \vec{E}_{e} e^{j\omega t}$ $\frac{\partial \vec{E}}{\partial t} = j\omega \vec{E}_{e} e^{j\omega t} = j\omega \vec{E}_{e} e^{j\omega t}$ $\frac{\partial \vec{E}}{\partial t} = j\omega \vec{E}$ $8. \left[\frac{\partial^2 \vec{E}}{\partial t^2} = (j\omega)^2 \vec{E}\right]$ $\frac{\partial \vec{E}}{\partial t^2} = (j\omega)^2 \vec{E}$.. PE = (jw/(0+jw)) E $\nabla^2 H = \left[j \omega \mu \left(\sigma + j \omega \varepsilon_e \right) \right] \overrightarrow{H}$.

1. Propagation Constant:

The phasor form of EM wave equation is., $abla^2 E = \left[i\omega \mathcal{E}_{e} \left(\sigma + i\omega \mathcal{E}_{e} \right) \right] \vec{E} \cdot -\infty$ $abla^2 H = \left[i\omega \mu \left(\sigma + i\omega \mathcal{E}_{e} \right) \right] \vec{H} \cdot -\infty$

propagation Coestant, so2 = jw/ (5+jwE). -3

8 = JiWMO-WME

propagation

Constant

Constant

Constant

 $(2+j\beta)^2 = -\omega^2 \mu \xi + j \omega \mu \delta \rightarrow 4$

22+2jdβ-B2=-13/18+jのH5.

Equating Real posts, $\alpha^2 \beta^2 = -3 \mu \xi - 5$

Taking Modulus of (X+jB)2 => {eqn@}.

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2+ B2 = [w4,222 + w2,252 - 16).

Adding 5 & 6

2d2= - w2 4 &+ J w4 42 42 + 32 52.

$$2\alpha^{2} = -\omega^{2}\mu\xi + \sqrt{\omega^{4}\mu^{2}\xi_{1}^{2}\left(1 + \frac{\sigma^{2}}{\omega^{2}\xi_{1}^{2}}\right)}$$

$$d = \frac{-\omega^{2}\mu\xi_{2}}{2} + \frac{\omega^{2}\mu\xi_{2}}{2} \left[1 + \frac{\delta^{2}}{\omega^{2}\xi_{2}}\right]$$

$$x = \frac{\omega^{2} \mu_{4}}{2} \left[\int_{1+\frac{\delta^{2}}{\omega^{2} \xi^{2}}} - 1 \right]$$

$$\alpha = \omega \int_{\frac{\pi}{2}}^{\frac{\pi}{2}} \left[\int_{1+\frac{\sigma^2}{\sigma^2 \xi_2^2}} -1 \right]$$

$$\beta^2 = \frac{\omega \mu}{2} \int \omega^2 \xi^2 + \delta^2 + \frac{\omega^2 \mu \xi_2}{2}$$

$$\beta = \frac{\omega^{2} \pi \epsilon_{e}}{2} \left[\frac{2}{\omega^{2} \pi \epsilon_{e}} \frac{\omega_{e}}{2} + \delta^{2} + 1 \right]$$

$$= \frac{\omega^{2} \pi \epsilon_{e}}{2} \left[\frac{1}{\omega^{2} \epsilon_{e}^{2}} + \delta^{2} + 1 \right]$$

$$\beta = \omega \left[\frac{\pi \epsilon_{e}}{2} \right] \left[\frac{\omega^{2} \epsilon_{e}^{2}}{\omega^{2} \epsilon_{e}^{2}} + \delta^{2} + 1 \right]$$

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