Maxwell's Equations:

Notations fields $u(x,t)$	Units	Description
$E = (E_1, E_2, E_3)^T$	V/m	electric field intensity
$D = (D_1, D_2, D_3)^T$	As/m^2	electric flux density (el. induction)
$H = (H_1, H_2, H_3)^T$	A/m	magnetic field intensity
$B = (B_1, B_2, B_3)^T$	Vs/m^2	magnetic flux density (mag. ind.)
$J = (J_1, J_2, J_3)^T$	A/m^2	electric current density
$\varrho = \varrho(x,t)$	As/m^3	electric charge density
$M = (M_1, M_2, M_3)^T$	Vs/m^2	magnetization (permanent)
$P = (P_1, P_2, P_3)^T$	As/m^2	electric polarization

Maxwell's field equations:

$$\operatorname{curl} H = J + \frac{\partial D}{\partial t}$$

$$\operatorname{div} B = 0$$

$$\operatorname{curl} E = -\frac{\partial B}{\partial t}$$

$$\operatorname{div} D = \varrho$$

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$$\int_{\partial S} H \cdot \tau \, ds = \int_S \left(J + \frac{\partial D}{\partial t}\right) \cdot n \, dS$$

$$\int_{\partial V} B \cdot n \, dS = 0$$

$$\int_{\partial S} E \cdot \tau \, ds = -\int_S \frac{\partial B}{\partial t} \cdot n \, dS$$

$$\int_{\partial V} D \cdot n \, dS = \int_V \varrho \, dx$$

Constitutive Relations (Material Laws):

$$B = \mu H + \mu_0 M$$

$$D = \varepsilon E + P$$

$$J = J_c + J_i = \sigma(E + v \times B) + J_i$$