

Maxwell's equations (continued)

$$4. \oint \vec{B} \cdot d\vec{s} = \mu_0 I_{\text{through}} + \epsilon_0 \mu_0 \frac{d\Phi_E}{dt}$$

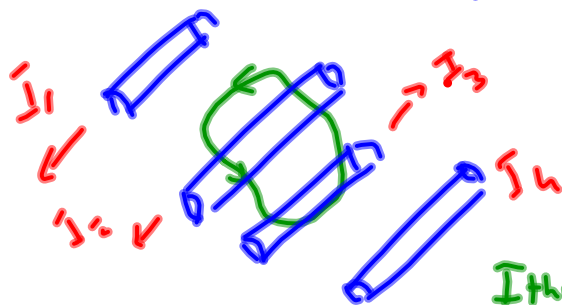


currents create
magnetic field

Ampère - Maxwell law



Magnetic field
can also be created
by a changing
electric field



$$I_{\text{through}} = I_2 - I_3$$

Remember $d\phi_E = \vec{E} \cdot d\vec{A}$

$$d\phi_B = \vec{B} \cdot d\vec{A}$$

Lorentz force Law

$$\vec{F} = q (\vec{E} + \vec{v} \times \vec{B})$$

an electric force is exerted on a charged particle in electric field

magnetic force is exerted on a charge moving in a magnetic field

Maxwell's eqns + Lorentz Law \Rightarrow
Complete theory of electromagnetism

We found that a current generated magnetic field.
But if you push a magnet into a coil of wire
or pull it out you induce current in the wire.

This is called **ELECTROMAGNETIC INDUCTION**.