Maxwells ekvationer – del 1

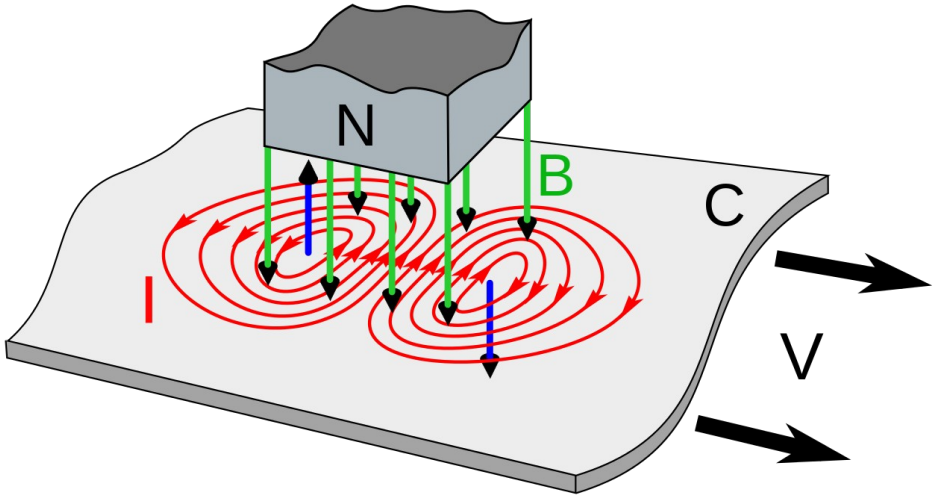
Föreläsning 9 - Elektromagnetism

Fredrik Jonsson

Uppsala University
Division for Electricity
Dept of Electrical Engineering

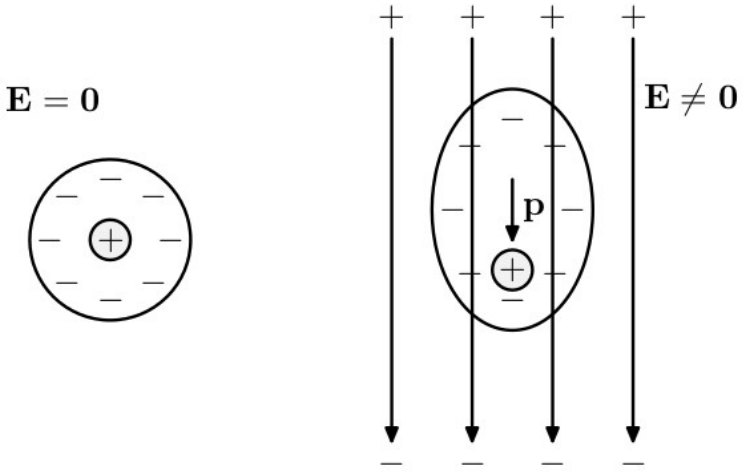
1TE626 (2022)

Virvelströmmar



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

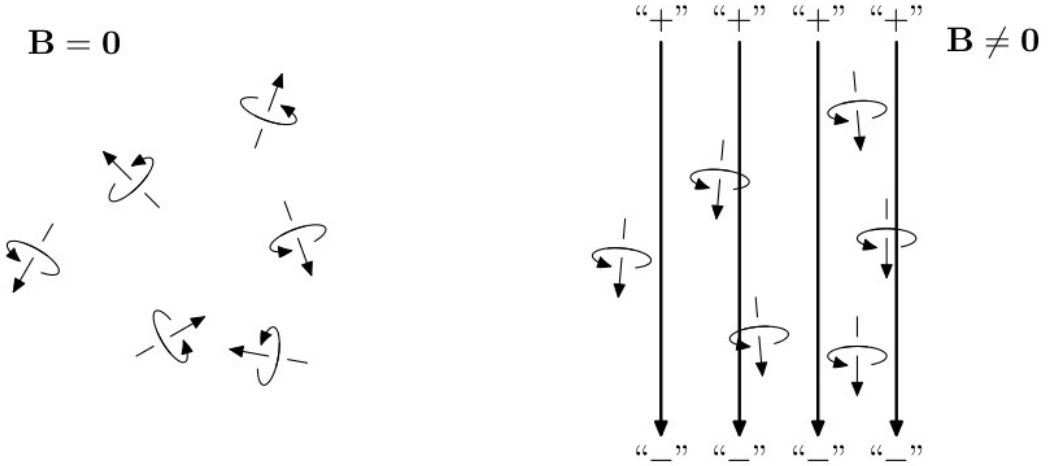
Elektrisk polarisationsdensitet



$$\mathbf{P} \equiv \left\langle \frac{d\mathbf{p}}{dV} \right\rangle = \varepsilon_0 \chi_\mathrm{e} \mathbf{E}$$

$$\mathbf{D} \equiv \varepsilon_0 \mathbf{E} + \mathbf{P}$$
$$= \varepsilon_0 (1 + \chi_\mathrm{e}) \mathbf{E} \equiv \varepsilon_0 \varepsilon_\mathrm{r} \mathbf{E}$$

Magnetism



$$\mathbf{M} \equiv \left\langle \frac{d\mathbf{m}}{dV} \right\rangle = \frac{1}{\mu_0} \left(1 - \frac{1}{\mu_\mathrm{r}} \right) \mathbf{B}$$

$$\mathbf{H} \equiv \frac{\mathbf{B}}{\mu_0} - \mathbf{M} = \frac{\mathbf{B}}{\mu_0 \mu_\mathrm{r}}$$

$$\mathbf{B} = \mu_0 \mu_\mathrm{r} \mathbf{H}$$