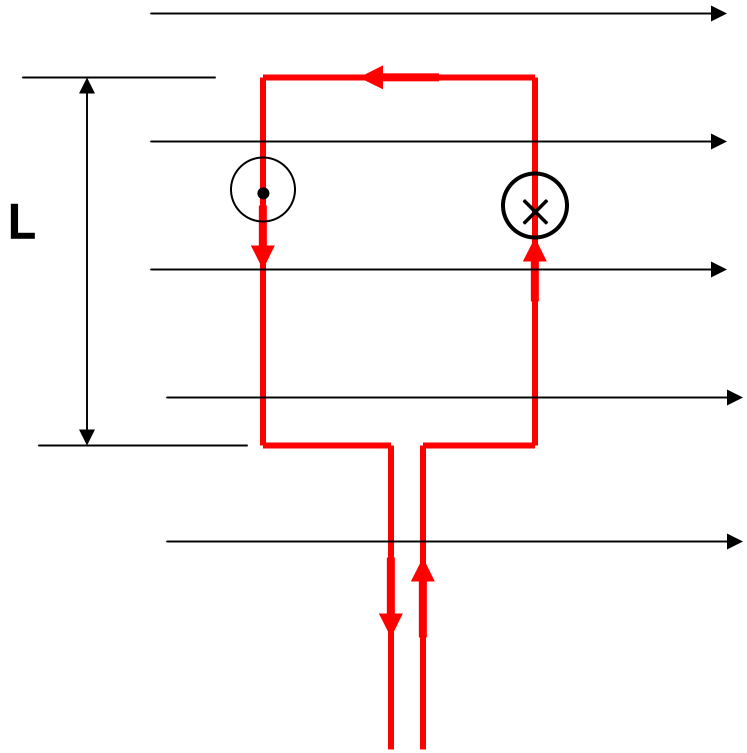
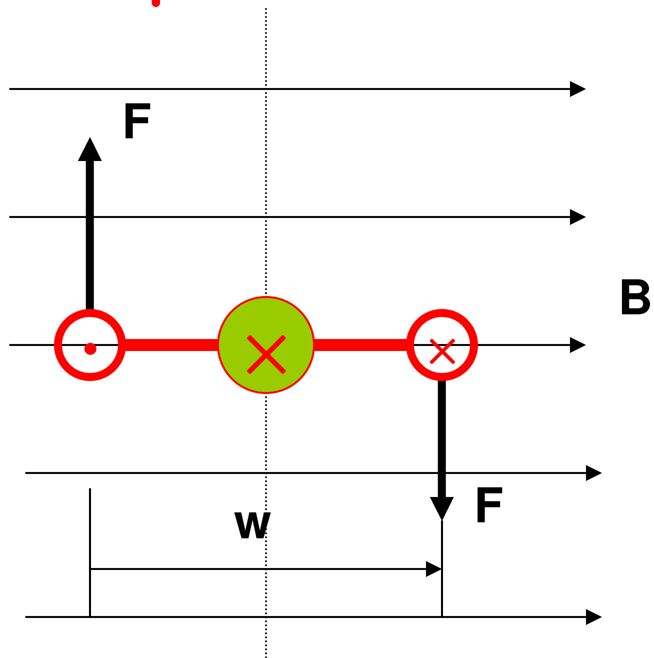
Torque on a Current Loop: Motors





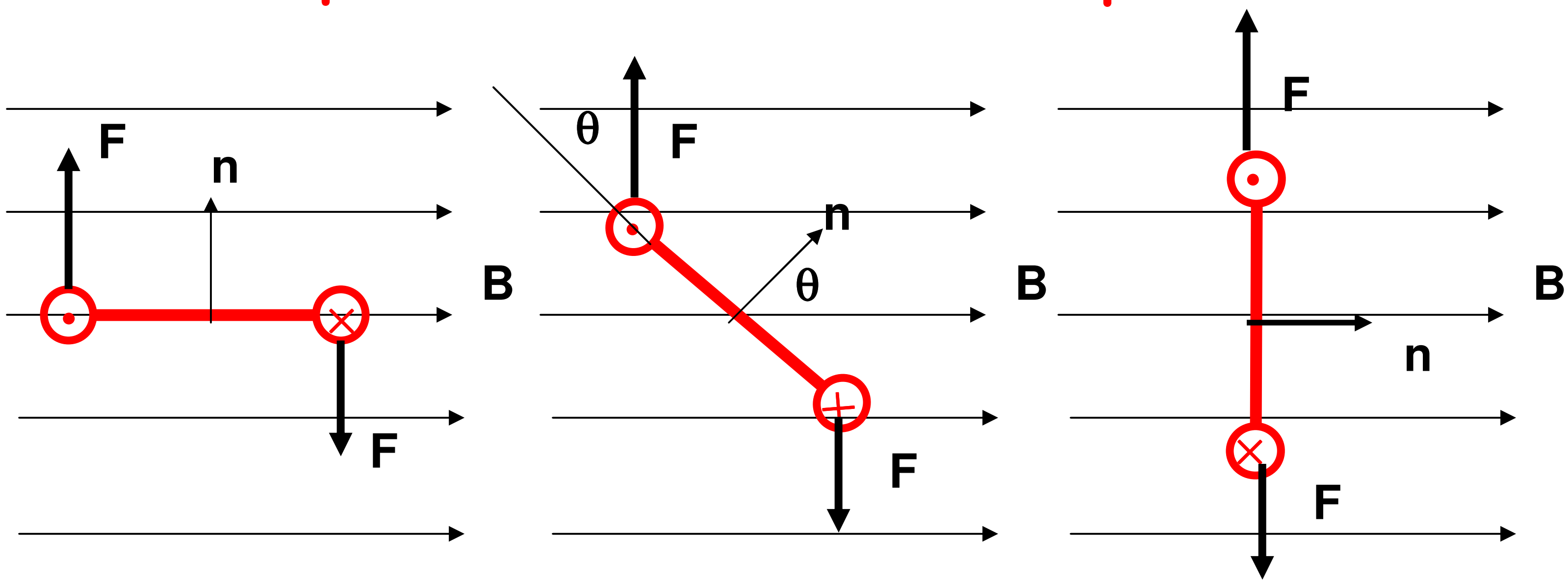
$$\vec{\tau} = \vec{r} \times \vec{F}$$

$$F = iLB$$

$$\tau = 2 \times \frac{w}{2} \times F = iBLw$$

$$\tau = iBA$$

Torque on a Current Loop: Motors

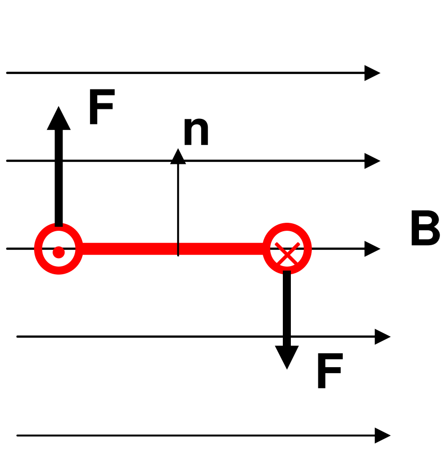


$$\tau = iBA$$

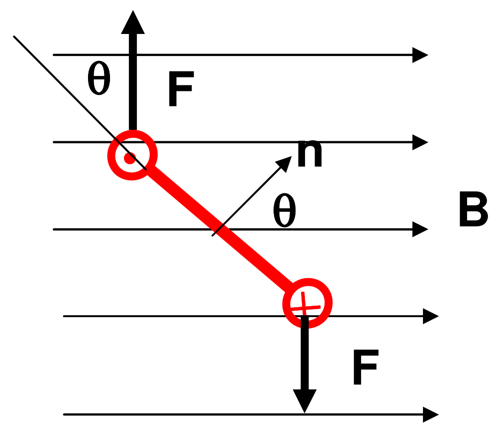
$$\tau = 2\times\frac{w}{2}\times F\sin\theta$$
$$= iBA\sin\theta$$

$$\tau = 0$$

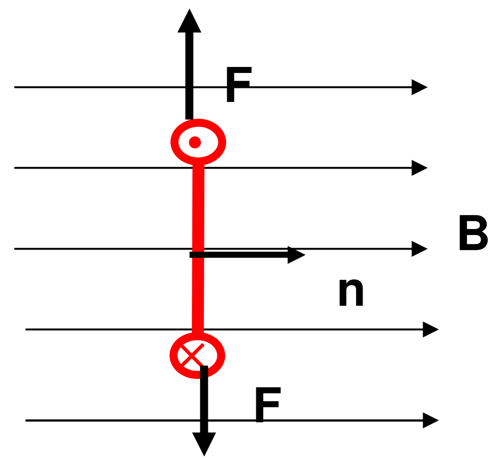
Torque on a Current Loop: Continuous



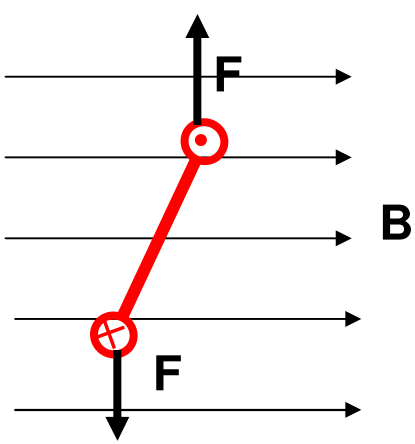
$$\tau = iBA$$

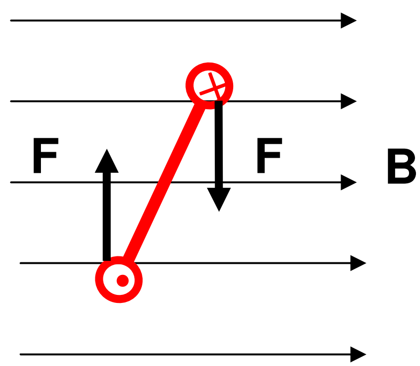


$$\tau = iBA\sin\theta$$

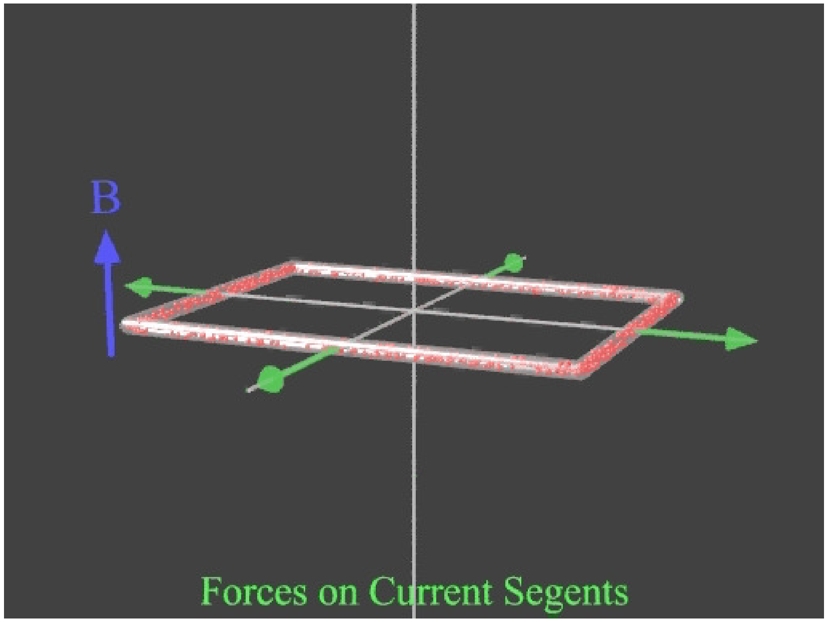


$$\tau = 0$$

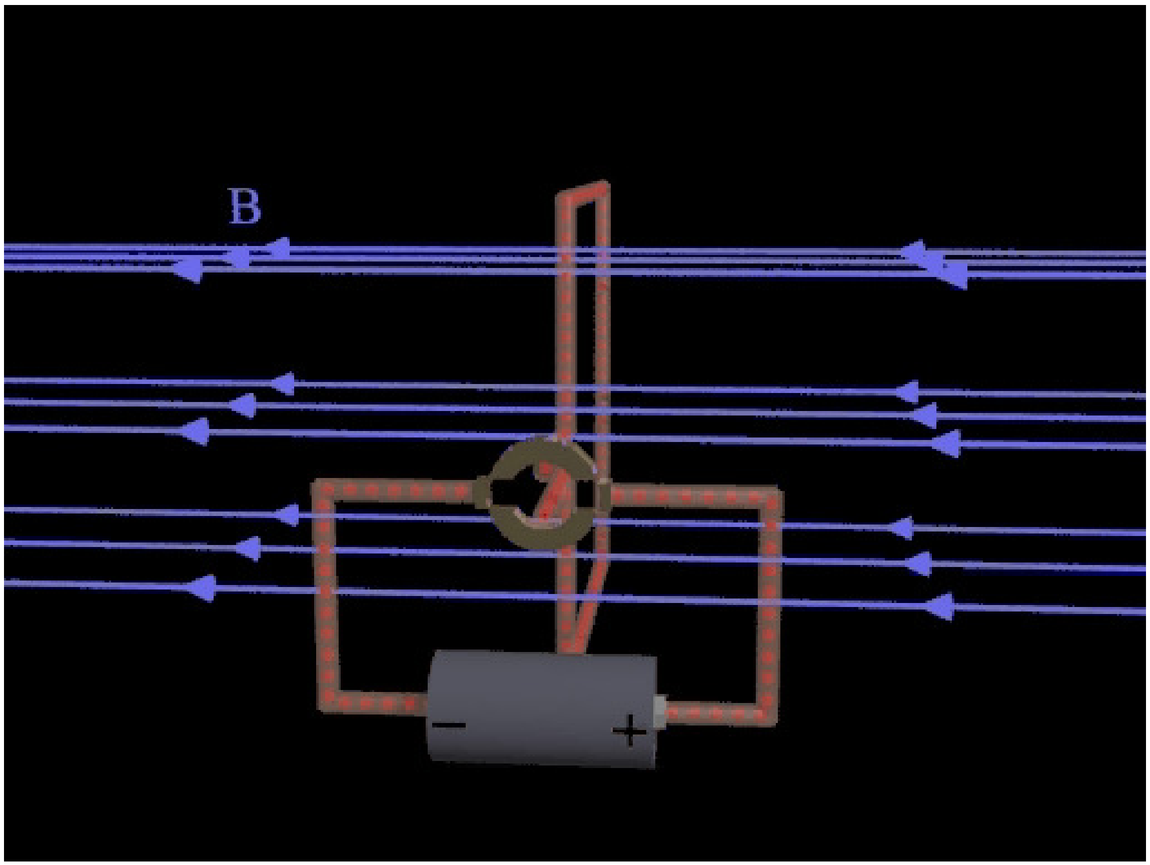


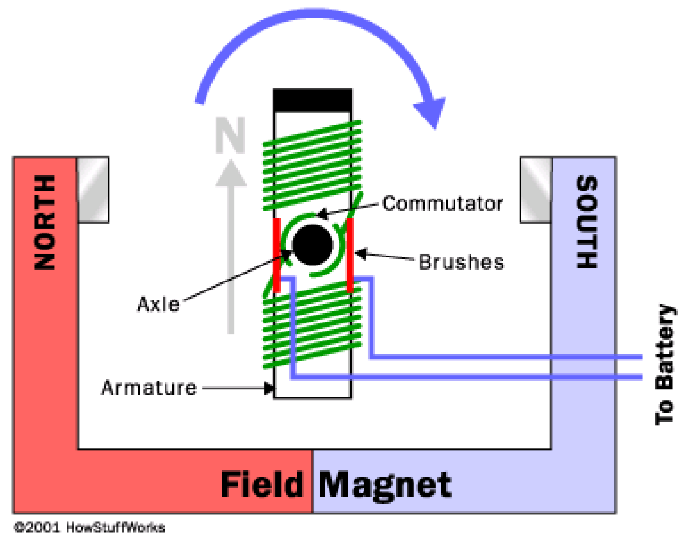


Torques on current loop

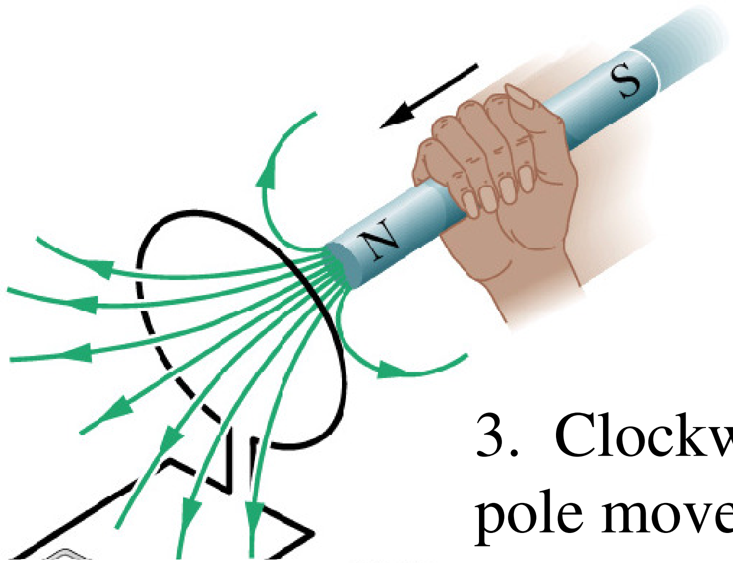


Principle of Motor





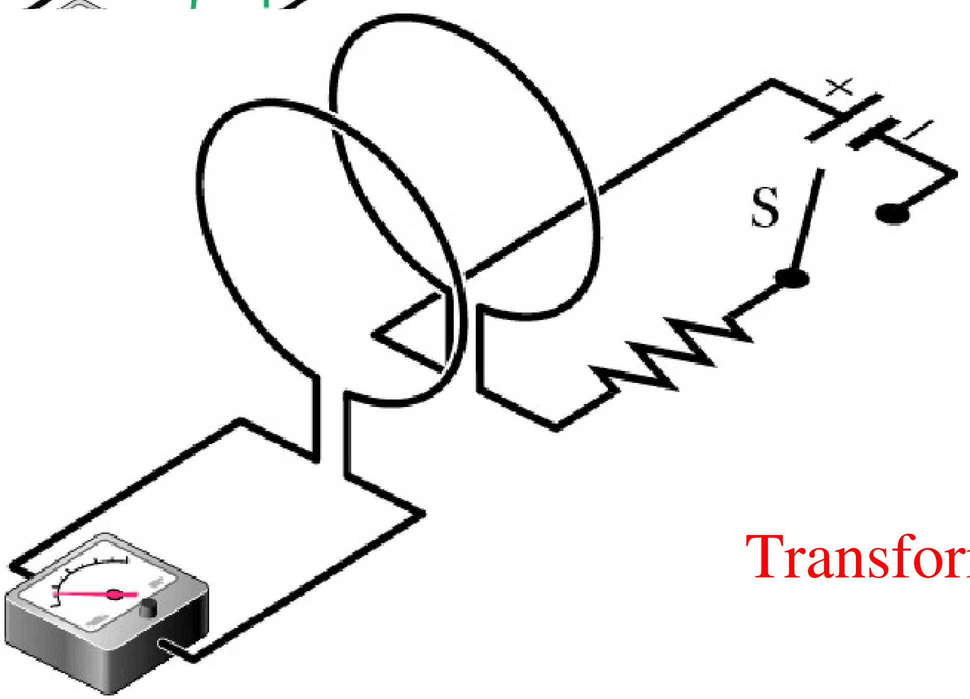
Generating Electricity (Faraday's law): Motion → Current or how to measure magnetic field



1. A current appears only if there is relative motion.

2. Fast motion produces a greater current.

3. Clockwise/counter clockwise current with north pole move in/out. Opposite with south pole.



Induced current in secondary coil, if there is change of current in the primary coil: switch or ac current

Transformer

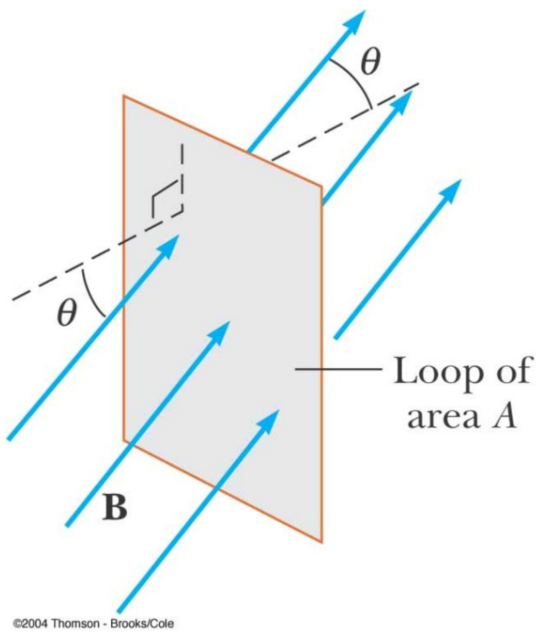
Magnetic flux

Magnetic flux through area A

$$\phi_B = \int \vec{B} \bullet d\vec{A}$$

Amount of magnetic field passes through an area A

For uniform B: $$\phi_B = BA\cos\theta$$ **(Weber, or Wb, or T m²**



For non-uniform B: integration