PHYS 212, Honors Section – Review Material

Chapter 31: Faraday's Law

- Magnetic flux Similarly to the flux of any other quantity, the flux of **B** through a surface *S* is

$$\Phi_B = \int_S \mathbf{B} \cdot d\mathbf{A} .$$

- Faraday's law: When the magnetic flux through a closed loop *C* changes in time,

$$\mathcal{E} = -N \, d\Phi_B/dt , \quad \text{or} \quad \int_C \mathbf{E} \cdot d\mathbf{s} = - d\Phi_B/dt .$$

- Lenz's law: The direction of the current induced around a loop of wire by a change in magnetic flux is such that the magnetic field it produces opposes the change in flux; If there is no actual wire, the emf is in the direction that would produce such a current.

- Motional emf: The potential difference induced across a conductor of length *l* (perpendicular to the velocity and to **B**) moving with velocity **v** in a direction perpendicular to a magnetic field **B** is

$$\mathcal{E} = -Blv .$$

Note: You are not required to know the topics and equations inside square brackets.

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