PHYS 5C:

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I. Inductions

- $\frac{\mathrm{dB}}{\mathrm{dt}} \neq 0$
- Electromagnetic Induction:

  $I_B = \int \mathrm{BdA}$

  $\epsilon = \frac{-\mathrm{dI}_B}{\mathrm{dt}} \qquad \text{Lenz Law}$

  Once determine direction of induced current, can often use absolute values

II. $\frac{\mathrm{dB}}{\mathrm{dt}}$ nonzero, fixed A and orentation

- Conducting loop, area A_{loops}, resistance R inside a solenoid that has $\frac{\mathrm{dI}}{\mathrm{dt}} \neq 0 \Rightarrow \frac{\mathrm{dB}}{\mathrm{dt}} \neq 0$

  $B = \mu_0 \mathrm{nI}$ uniform inside
- Careful of:

  1. There are two difference currents: in the solenoid, I, and induced in the loop I_{loops}

  $I_{\text{loop}} = \frac{\varepsilon}{R} = \frac{\frac{\mathrm{dI}_B}{\mathrm{dt}}}{R} \qquad I_B = \mathrm{BA}_{\text{loop}} \quad \frac{\mathrm{dI}_B}{\mathrm{dt}} = A_{\text{loop}} \frac{\mathrm{dB}}{\mathrm{dt}} \Rightarrow A_{\text{loop}} \mu_0 n \frac{\mathrm{dI}}{\mathrm{dt}}$

  $I_{\text{loop}} = \frac{\mu_0 \mathrm{nA}_{\text{loop}}}{R} \frac{\mathrm{dI}}{\mathrm{dt}}$
- If loops in non $-$ conducting, $R \rightarrow \infty$, $I_{\text{loop}} \rightarrow 0$
- Could get the same I_{loop} if I were in the opposite

  Same $\frac{\mathrm{dB}}{\mathrm{dt}}$ if B is into board and decreasing or outward and increasing
- Bigger $A_{\text{loop}}\, d \Rightarrow I_{\text{loop}}$ (assuming same R)
- if the Loop radius is bigger than the solenoid radius, then 0