

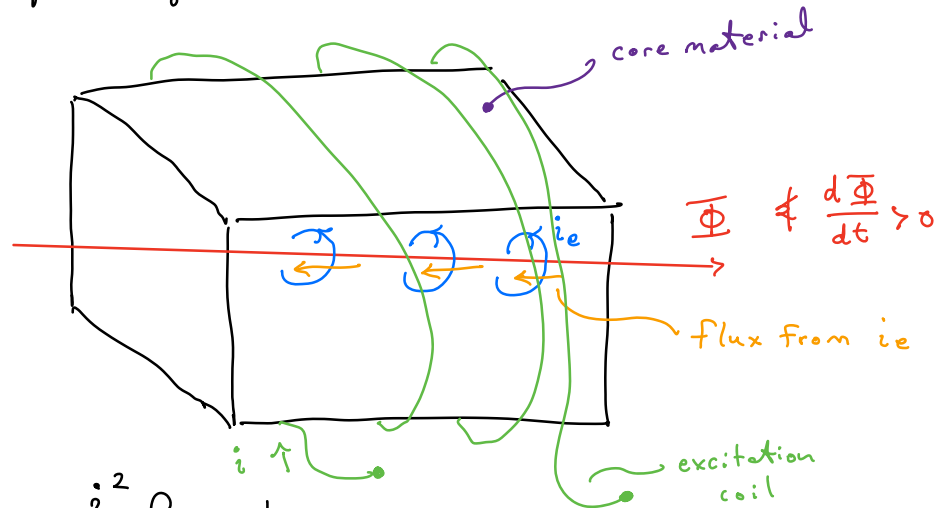
Lecture # 23, 11/24/21

- Finish motor modeling handout from beginning of quarter
- If we have time
  - Ch 10, Eddy Currents

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## - Core eddy current loss

- Core materials often conductive
- Faraday & Lenz's Law say currents will be induced inside core to oppose flux change
- Eddy currents tend to prevent flux from penetrating into core



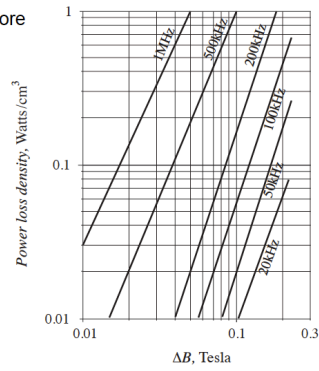
Causes  $i_e^2 R_{core}$  losses  
 ↑  
 resistance of core material

$$i_e \propto \frac{d\Phi}{dt} \propto f \text{ of excitation current in coil}$$

Another Steinmetz empirical model

$$P_E = k_E f^2 B_{max}^2 \times (\text{core volume})$$

Ferrite core material



Empirical equation, at a fixed frequency:

$$P_{fe} = K_{fe} (\Delta B)^{\beta} A_c \ell_m$$

