JoVE: Science Education

Introduction to Designing a Power Inductor

--Manuscript Draft--

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WIP

Essential Equations for a Core of Area (A_c), Length (l), Permeability (μ_r), and N turns:

- Reluctance (R)=$l/(\mu_r\mu_o A_c)$
- Inductance (L)=N^2/R
- Flux (φ)= $\mu_r\mu_o A_c Ni/l$
- Flux density (B)= φ/A_c
- μ_o=$4\pi\times10^{-7}$ V·s/(A·m)
- Permeability of air is approximately μ_o.

Ampere's Law:

where H is the magnetic field intensity, C is a closed contour, and A is a surface area.

Faraday's Law:

Gauss's Law for Magnetism: