

Magnetic Circuits

Reading assignment

Ulaby, 6-3, 6-5

Connor and Salon, Appendix VI

Problem 1 - transformer, magnetic circuits

- Evaluate $\int \mathbf{H} \cdot d\mathbf{l}$ around the dashed line in the figure on the left below. Then, determine $|\mathbf{H}|$ and $|\mathbf{B}|$ in the iron core. Make reasonable approximations.
- What is the inductance, L ?
- For the figure on the left, what are the reluctance and magnetomotive force? Draw a magnetic circuit equivalent and show how to solve for the inductance using the circuit.
- Analyze the situation on the right using magnetic circuits. Determine the flux through the iron core. What is the inductance? What is \mathbf{H} in the core and in the gap?
- Calculate numerical values for L , $|\mathbf{H}|_{\text{gap}}$ and $|\mathbf{H}|_{\text{core}}$ when $N = 1000$, $I = 1 \text{ A}$, $w = 5 \text{ cm}$, $g = 1 \text{ cm}$, $l = 20 \text{ cm}$, and $\mu_r = 5000$.

