Lecture 28

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1 Hysteresis

"Soft" magnetic matierials have small residual $\vec{B}$ values, being easily magnetised and demagnetised.
"Hard" magnetic materials are the opposite, having high residual $\vec{B}$ values. They are difficult to demagnetise, and make good permanent magnets. However, there is a greater energy loss when applied field $\vec{H}$ varies with time.

2 Boundary Conditions

From

$$\oiint_S \vec{B} \cdot d\vec{S} = 0$$

Observe that the integral is equal to $\vec{B}_{n1} - \vec{B}_{n2}$, meaning the normal component of $\vec{B}$ is preserved when crossing a magnetic materia.
Now consider a closed loop of length Δl along $\vec{H}$. Then

$$\oint_c trclockwise\vec{H} \cdot d\vec{l} = H_{t2}\Delta l - H_{t1}\Delta l = J_S \Delta l \Rightarrow \hat{n}_2 \times (\vec{H}_1 - \vec{H}_2) = \vec{J}_S$$