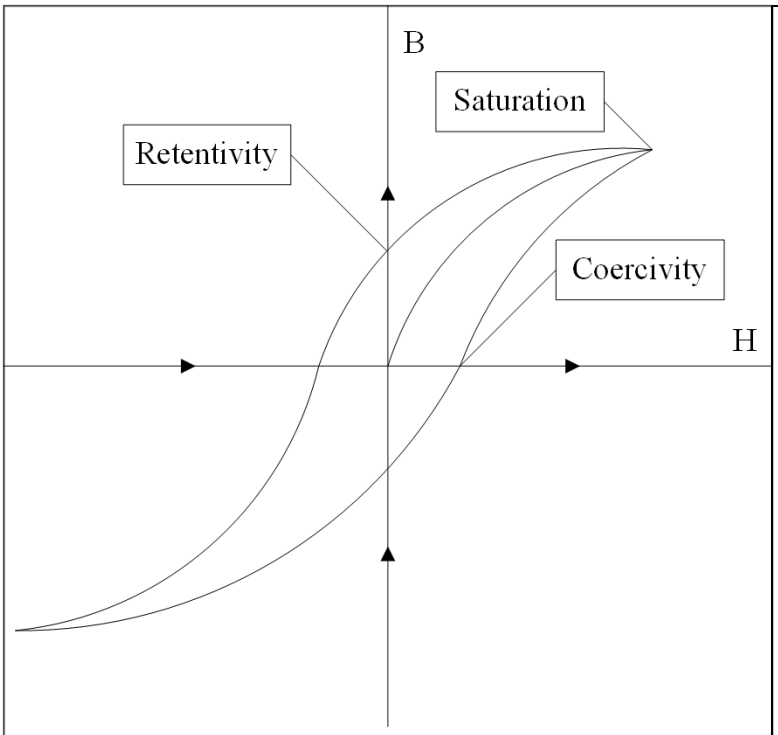


Archetypal B-H Curve

B-H Curve Governing Expressions/Definitions

$$B = \mu(M) \times (H + M)$$

$$\mu(M) = K_m(M) \times \mu_0$$

B – Magnetic flux density (Wb/m^2, T)

H – Magnetic field strength (A/m)

M – Magnetization of material (A/m)

$\mu(M)$ – Magnetic permeability (N/A^2)

μ_0 – Free space permeability ($4\pi \times 10^{-7}\ N/A^2$)

$K_m(M)$ – Relative permeability

B, H expressions

$$\phi\ [flux, Wb] = BA$$

$$I = \oint Hdl \rightarrow H = \frac{I}{2\pi r}\ [wire, distance\ r]$$

General expression for H:

$$H = \frac{NI}{l}$$

N – number of turns

I – current through wire

l – effective magnetic path length

Faraday's law:

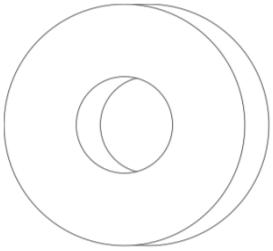
$$V = -N\frac{d\phi}{dt}$$

V – volts

Core magnetic path lengths

Cylinder – path length is simply cylinder length

Toroid:



$$l = \frac{\pi(OD - ID)}{\ln(\frac{OD}{ID})}$$