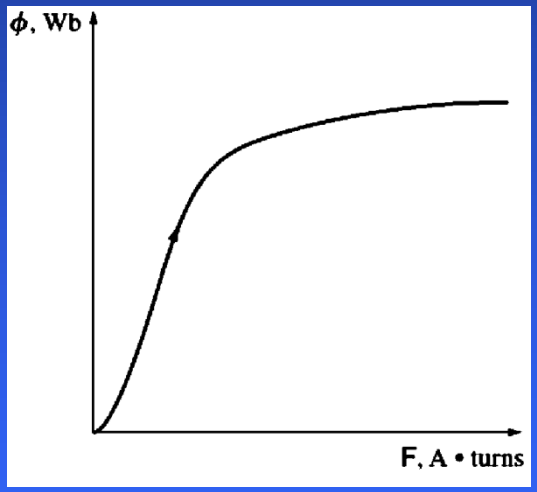
3. The magnetic field

3.3. Magnetic behavior of ferromagnetic materials

for the ferromagnetic materials (for which permeability can be up to 6000 times the permeability of air), permeability is not a constant…

I	$\mathcal{F}$	ϕ
0	0	0
1		



A magnetization curve (saturation curve) for a DC source

3. The magnetic field

H α F

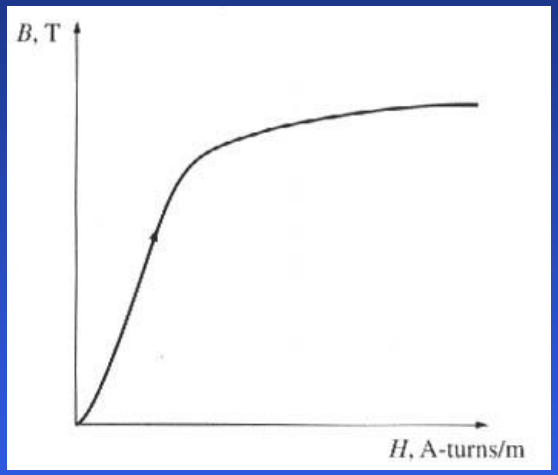
B α ϕ

$$H = \frac{Ni}{l_c} = \frac{\mathcal{F}}{l_c}$$

$$\phi = BA$$

Magnetic permeability can be defined as:

$$\mu = \frac{B}{H}$$



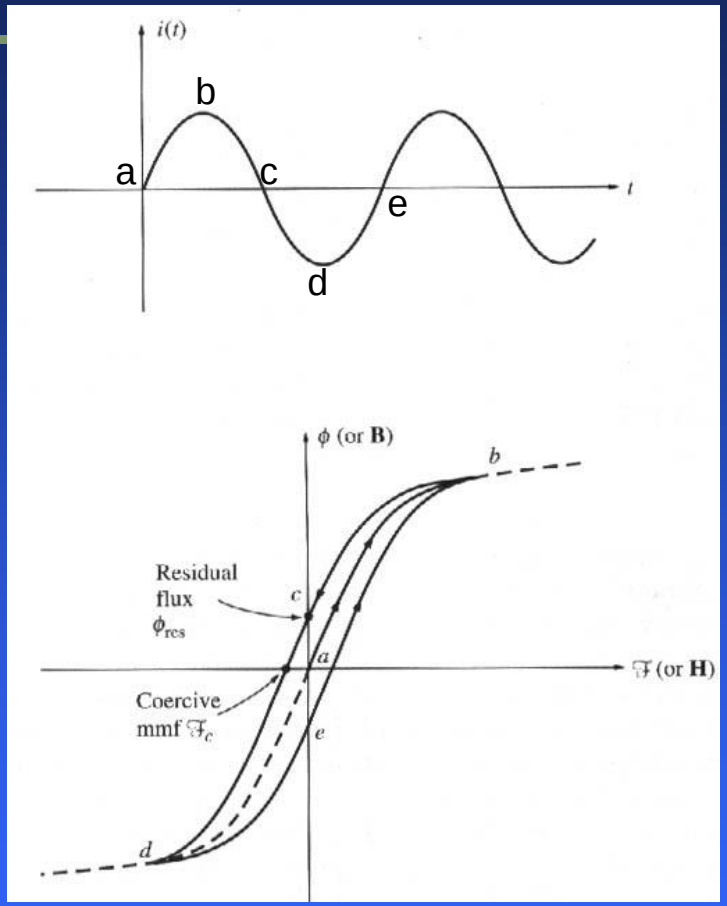
A saturation curve

3. The magnetic field

3.4. Energy losses in a ferromagnetic core

If instead of a DC, a sinusoidal current is applied to a magnetic core, a hysteresis loop will be observed…

If a large mmf is applied to a core and then removed, the flux in a core does not go to zero! A magnetic field (or flux), called the residual field (or flux), will be left in the material. To force the flux to zero, an amount of mmf (coercive mmf) is needed.



The hysteresis loss in the core is the energy required to reorient domains during each cycle of AC applied to the core.