

Inductor

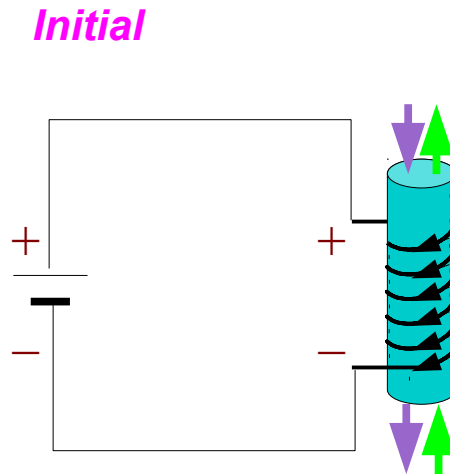
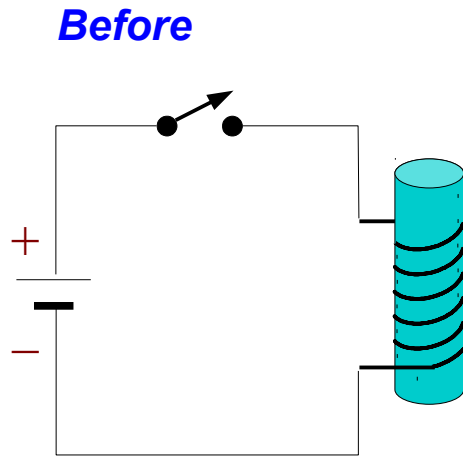
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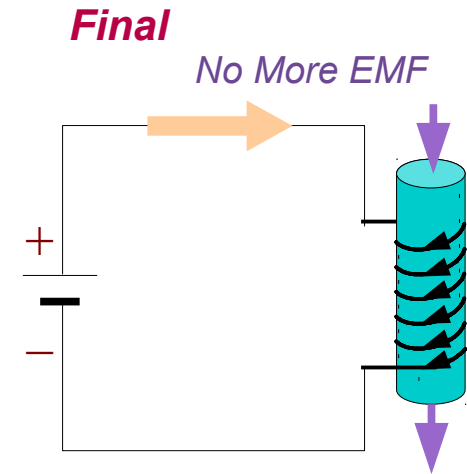
Please send corrections (or suggestions) to youngwlim@hotmail.com.

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Resist Magnetic Field



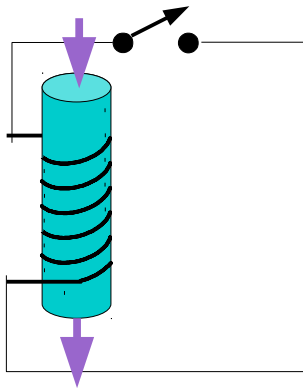
Induced EMF



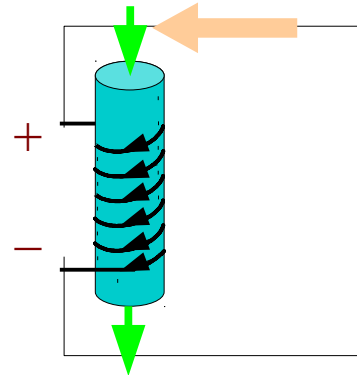
Energy stored in Electric Field

Maintain Magnetic Field

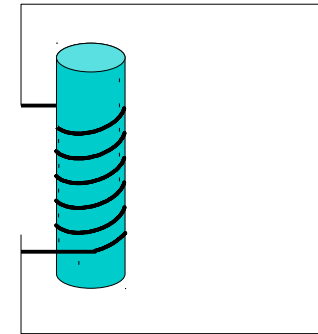
Before



Initial



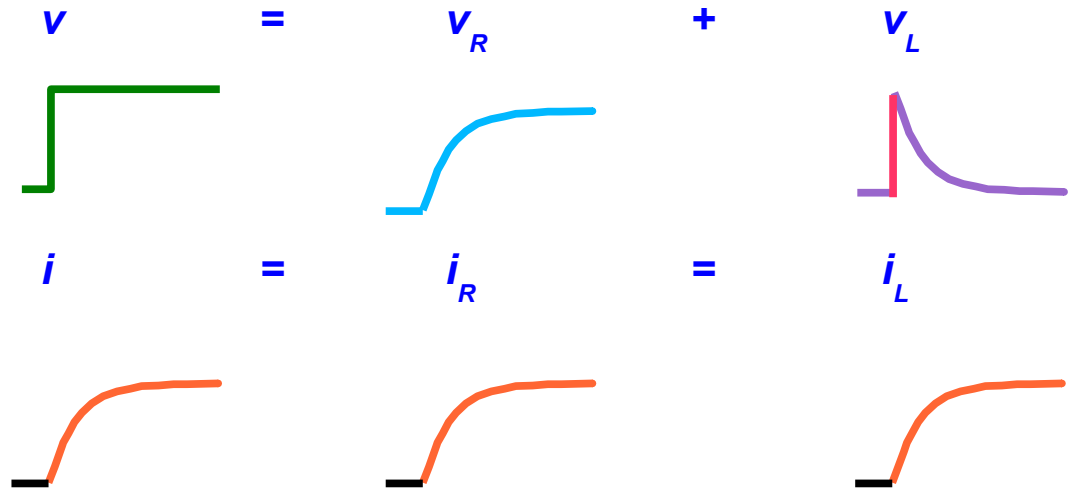
Final



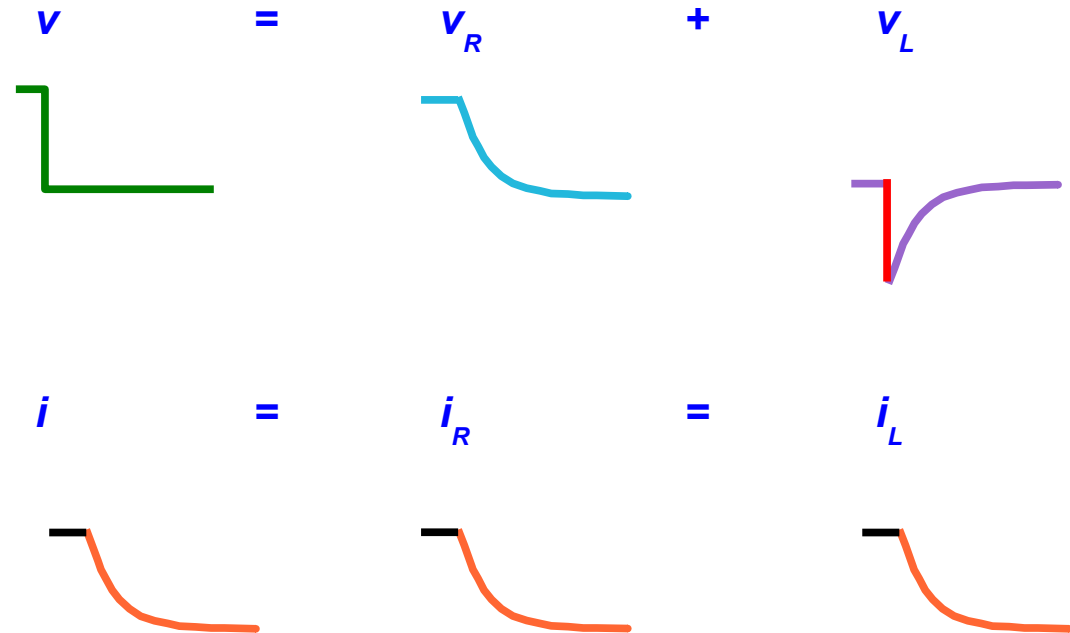
No Energy in magnetic field

Induced EMF

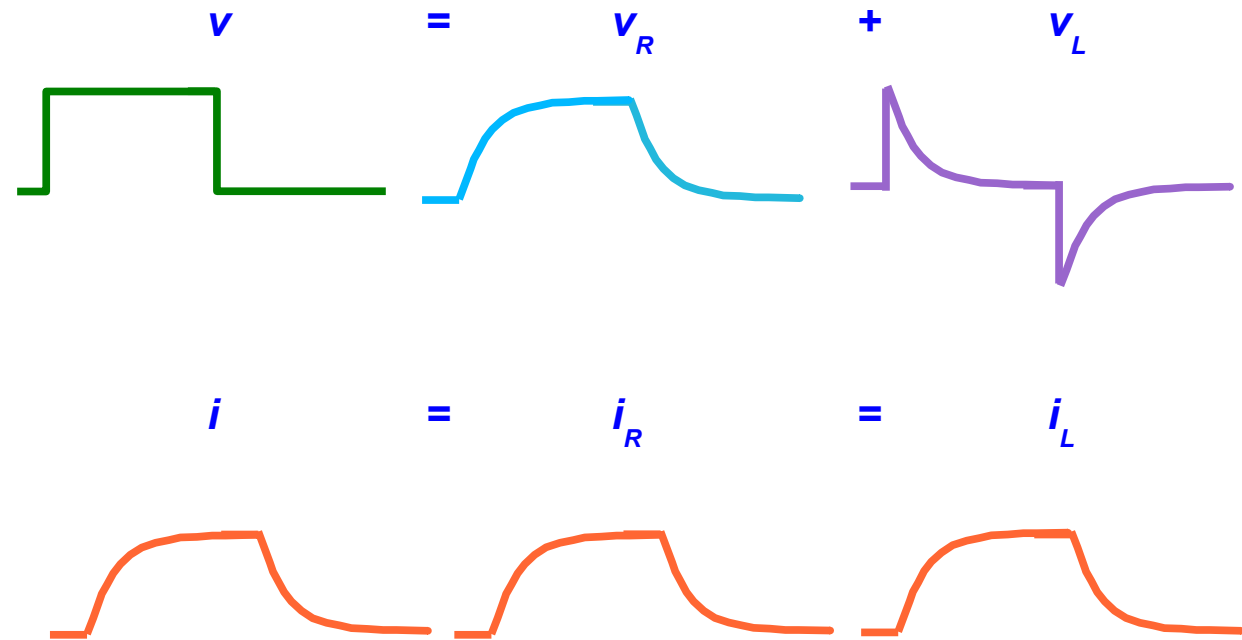
Storing Magnetic Energy



Dissipate Magnetic Energy



Pulse



Sinusoid (Sine Waves)

$$A \cos(\omega t + \theta)$$

$$\left\{ \begin{array}{ll} \text{Amplitude} & A \\ \text{Angular Frequency} & \omega \\ \text{Angular Frequency} & \theta \end{array} \right.$$

1. Representation using Euler's Formula

$$A \cos(\omega t + \theta) = \frac{A}{2} \cdot e^{+i(\omega t + \theta)} + \frac{A}{2} \cdot e^{-i(\omega t + \theta)}$$

2. Representation using Real Part

$$A \cos(\omega t + \theta) = \operatorname{Re}\{A e^{i(\omega t + \theta)}\} = \operatorname{Re}\{A e^{i\theta} \cdot e^{i\omega t}\}$$

$$\rightarrow A e^{i\theta} \cdot e^{i\omega t}$$

$$\rightarrow A e^{i\theta}$$

$$\rightarrow A \angle \theta$$

Phase Lags and Leads

$$\frac{d}{dx} f(x) = \cos(x) \quad \text{leads} \quad f(x) = \sin(x)$$

$$\frac{d}{dx} f(x) = -\sin(x) \quad \text{leads} \quad f(x) = \cos(x)$$

$$\int f(x) dx = -\cos(x) + C \quad \text{lags} \quad f(x) = \sin(x)$$

$$\int f(x) dx = \sin(x) + C \quad \text{lags} \quad f(x) = \cos(x)$$

$$\frac{d}{dx} f(x) \quad \text{leads} \quad f(x) \quad \text{by} \quad \frac{\pi}{2}$$

$$\int f(x) dx \quad \text{lags} \quad f(x) \quad \text{by} \quad \frac{\pi}{2}$$

References

- [1] <http://en.wikipedia.org/>
- [2] J.H. McClellan, et al., Signal Processing First, Pearson Prentice Hall, 2003