New Electromagnetism V3 Quick Reference Chart

The World Leader in Electromagnetic Physics
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$$K_E = \frac{1}{4\pi\varepsilon} \qquad K_M = \frac{\mu}{4\pi}$$

(*) = unfinished or unreleased (!)=tentative, requires more investigation

Charge-Force Forms (most fundamental, see ne.pdf)

Coulomb's Model (ne.pdf)

$$\mathbf{F} = \frac{K_E Q_S Q_T \hat{\mathbf{r}}}{|\mathbf{r}|^2}$$

New Magnetism (nm.pdf)

$$\mathbf{F} = \frac{K_M Q_S Q_T}{|\mathbf{r}|^2}\left[(\mathbf{v}_T \bullet \hat{\mathbf{r}})\mathbf{v}_S - (\mathbf{v}_S \bullet \hat{\mathbf{r}})\mathbf{v}_S - (\mathbf{v}_S \bullet \mathbf{v}_T)\hat{\mathbf{r}}\right]$$

New Induction (ni.pdf)

$$\mathbf{F} = \frac{-K_M Q_S Q_T \mathbf{a}_S}{|\mathbf{r}|}$$

Charge-Fragment conversion (ne.pdf)

$$\int_L \rho_L dL = Q \qquad \rho_L = dQ/dL$$

$$\int_L I d\mathbf{L} = Q\mathbf{v}$$

$$\int_L \frac{dI}{dt} d\mathbf{L} = Q\mathbf{a}$$

Fragmentary Forms (ne.pdf or nm.pdf)

$$d^2V_P = -K_E \rho_{LS} \frac{dL_S \hat{\mathbf{r}} \bullet d\mathbf{L}_T}{|\mathbf{r}|} \quad \text{(ne.pdf)}$$

(nm.pdf)

$$d^2V_K = \frac{-K_M I_S}{r^2}\left[\left(\frac{I_S}{Q_S}(d\mathbf{L}_S \bullet \hat{\mathbf{r}}) + (\mathbf{v}_{FS} \bullet \hat{\mathbf{r}}) - (\mathbf{v}_{FT} \bullet \hat{\mathbf{r}})\right)(d\mathbf{L}_S \bullet d\mathbf{L}_T) + (d\mathbf{L}_S \bullet \hat{\mathbf{r}})(\mathbf{v}_{FS} \bullet d\mathbf{L}_T) + (d\mathbf{L}_T \bullet \hat{\mathbf{r}})(\mathbf{v}_{FT} \bullet d\mathbf{L}_S)\right]$$

$$d^2V_K = -K_M \frac{dI_S}{dt} \frac{d\mathbf{L}_S \bullet d\mathbf{L}_T}{|\mathbf{r}|} \quad \text{(ne.pdf)}$$

Kirchoff's rules and curl: These are valid for both static and dynamic conditions.

$$\oint_L \mathbf{E} \bullet d\mathbf{L} = 0$$

$$\nabla \times \mathbf{E} = 0$$

$$\oint_L \mathbf{M} \bullet d\mathbf{L} = V_K$$

$$\nabla \times \mathbf{M} = (*)$$

Charge-Field Forms (ne.pdf)

$$\mathbf{E} = \frac{K_E Q_S \hat{\mathbf{r}}}{|\mathbf{r}|^2}$$

$$\mathbf{M} = \frac{K_M Q_S}{|\mathbf{r}|^2}\left[(\mathbf{v}_T \bullet \hat{\mathbf{r}})\mathbf{v}_S - (\mathbf{v}_S \bullet \hat{\mathbf{r}})\mathbf{v}_S - (\mathbf{v}_S \bullet \mathbf{v}_T)\hat{\mathbf{r}}\right]$$

$$\mathbf{M} = \frac{-K_M Q_S \mathbf{a}_S}{|\mathbf{r}|}$$

Voltage Definitions (ne.pdf)

$$V_P = -\int_L \mathbf{E} \bullet d\mathbf{L} \qquad V_P = \frac{PE}{Q}$$

$$V_K = \int_L \mathbf{M} \bullet d\mathbf{L} \quad \text{For M uniform in cross-section} \qquad V_K = \frac{KE}{Q}$$

$$V_K = \frac{1}{A}\int_A \int_L (\mathbf{M} \bullet d\mathbf{L}) dA \quad \text{For non-uniform M}$$

Wire Forms (ne.pdf). These are derived by integrating the fragmentary forms. For simplicity, these assume uniformity over the cross-section which may not be applicable in some cases. These integrations can be further simplified by assuming that ρ and I are uniform along the length of the wire.

$$V_P = -K_E \int_S \int_T \rho_{LS} \frac{dL_S \hat{\mathbf{r}} \bullet d\mathbf{L}_T}{|\mathbf{r}|^2} \quad \text{(ne.pdf)}$$

$$V_K = -K_M \oint_S \oint_T \frac{I_S}{|\mathbf{r}|^2}\left[((\mathbf{v}_{FS} - \mathbf{v}_{FT}) \bullet \hat{\mathbf{r}})(d\mathbf{L}_S \bullet d\mathbf{L}_T) + (d\mathbf{L}_S \bullet \hat{\mathbf{r}})(\mathbf{v}_{FS} \bullet d\mathbf{L}_T) + (d\mathbf{L}_T \bullet \hat{\mathbf{r}})(\mathbf{v}_{FT} \bullet d\mathbf{L}_S)\right] \quad \text{(nm.pdf)}$$

$$V_K = -K_M \int_S \int_T \frac{dI_S}{dt} \frac{d\mathbf{L}_S \bullet d\mathbf{L}_T}{|\mathbf{r}|} \quad \text{(ne.pdf)}$$

Poisson

$$\nabla^2 V_P = -4\pi K_E \rho_V$$

$$\nabla^2 V_K = 0(!)$$

Divergence

$$\nabla \bullet \mathbf{E} = 4\pi K_E \rho_V$$

$$\nabla \bullet \mathbf{M} = 0(!)$$

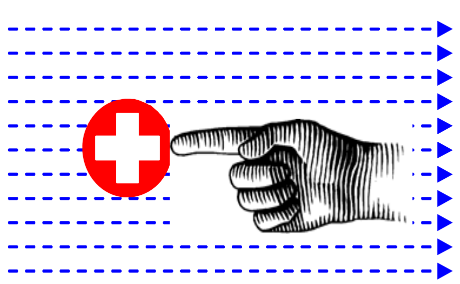
Gradient

$$\nabla V_P = -\mathbf{E}$$

$$\nabla V_K = (*)$$

Energy Definitions (ne.pdf) (these are still somewhat tentative)

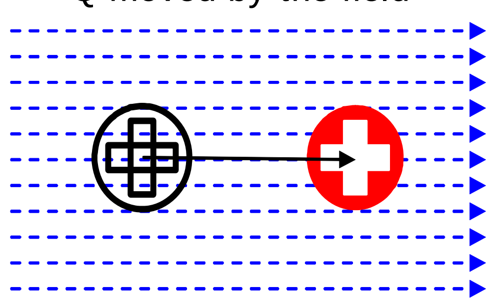
Q moved against field



$$PE = -Q \int_{against} \mathbf{E} \bullet d\mathbf{L}$$

$$DE = -Q \int_{against} \mathbf{M} \bullet d\mathbf{L}$$

Q moved by the field



$$KE = Q \int_{with} \mathbf{E} \bullet d\mathbf{L}$$

$$KE = Q \int_{with} \mathbf{M} \bullet d\mathbf{L}$$

The "rule" of nearly instantaneous conversion. This is for low frequency, low loss conditions only (ne.pdf).

$$V_K \cong -V_P$$

New Electromagnetism represents a more complete accounting of electromagnetic interactions than classical theory (Maxwell et al). These models should never be considered "finished." As more phenomena are encountered or as conventions are updated, these models will be revised accordingly.

Present changes under consideration include the use of "I-Field" for New Induction instead of M-Field. This change may affect the energy definitions.

All pdf files referenced can be found at www.distinti.com/docs

The B and H fields of classical theory, as well as all derived constructs, are obsolete. See the_secrets_of_qvxb.pdf for details.