$q = \int \rho(\mathbf{x}') \, d^3x'$ Monopole (4.4)

$\mathbf{p} = \int \mathbf{x}'\rho(\mathbf{x}') \, d^3x'$ Dipole (4.8)

$Q_{ij} = \int (3x'_i x'_j - r'\delta_{ij})\rho(\mathbf{x}')d^3x'$ Quadrupole (4.9)

$\Phi(\mathbf{x}) = \frac{1}{4\pi\epsilon_0}\left[\frac{q}{r} + \frac{\mathbf{p}\cdot\mathbf{x}}{r^3} + \frac{1}{2}\sum_{i,j} Q_{ij}\frac{x_i x_j}{r^5} + ...\right]$

Multipole Expansion (4.10)

$E_r = \frac{2p\cos\theta}{4\pi\epsilon_0}, \quad E_\theta = \frac{2p\sin\theta}{4\pi\epsilon_0}$ Dipole in $\hat{\mathbf{z}}$ (4.12)

$\mathbf{E}(\mathbf{x}) = \frac{3\mathbf{n}(\mathbf{p}\cdot\mathbf{n}) - \mathbf{p}}{4\pi\epsilon_0|\mathbf{x}-\mathbf{x}_0|^3}$ **E**-field due to dipole **p** (4.13)

$W = \int \rho(\mathbf{x})\Phi(\mathbf{x}) \, d^3x$ Charge in *external* field (4.21)

$W = q\Phi(0) - \mathbf{p}\cdot\mathbf{E}(0) - \frac{1}{6}\sum_i\sum_j Q_{ij}\frac{\partial E_j}{\partial x_i}(0) + ...$

Energy multipole expansion (4.24)

$\mathbf{P}(\mathbf{x}) = \sum_i N_i \langle \mathbf{p}_i \rangle$ Electric polarization (4.28)

$\mathbf{D} = \epsilon_0\mathbf{E} + \mathbf{P}$ Electric displacement(4.34)

$\mathbf{P} = \epsilon_0\chi_e\mathbf{E}$ Induced polarization (4.36)

$\mathbf{D} = \epsilon\mathbf{E}$ Electric displacement (4.37)

$\epsilon = \epsilon_0(1+\chi_e)$ Electric permittivity (4.38)

$\begin{cases} (\mathbf{D}_2 - \mathbf{D}_1)\cdot\mathbf{n}_{21} = \sigma \\ (\mathbf{E}_2 - \mathbf{E}_1 \times \mathbf{n}_{21}) = 0 \end{cases}$ Boundary conditions (4.40)

$\Phi_{\text{in}} = -\left(\frac{3}{\epsilon/\epsilon_0 + 2}\right)E_0 r\cos\theta$

$\Phi_{\text{out}} = -E_0 r\cos\theta + \left(\frac{\epsilon/\epsilon_0 - 1}{\epsilon/\epsilon_0 + 2}\right)E_0\frac{a^3}{r^2}\cos\theta$

Dielectric sphere in uniform **E**-field (4.54)

$W = \frac{1}{2}\int \mathbf{E}\cdot\mathbf{D} \, d^3x$ Electrostatic Energy (4.89)

$W = -\frac{1}{2}\int_{V_1} \mathbf{P}\cdot\mathbf{E}_0 \, d^3x$ Dielectric placed in $\mathbf{E}_0$ (4.93)

$\mathbf{N} = \boldsymbol{\mu}\times\mathbf{B}$ Torque on magnetic dipole moment (5.1)

$\nabla\cdot\mathbf{J} = 0$ Condition of magnetostatics (5.3)

$d\mathbf{B} = kI\frac{d\mathbf{l}\times\mathbf{x}}{|\mathbf{x}|^3}$ Biot-Savart Law (5.4)

$\mathbf{F} = \int \mathbf{J}(\mathbf{x})\times\mathbf{B}(\mathbf{x}) \, d^3x$ Force on current dist. (5.12)

$\mathbf{N} = \int \mathbf{x}\times(\mathbf{J}\times\mathbf{B}) \, d^3x$ Torque on current dist. (5.13)

$\oint_C \mathbf{B}\cdot d\mathbf{l} = \mu_0 I$ Ampères law (5.25)

$\mathbf{B}(\mathbf{x}) = \nabla\times\mathbf{A}(\mathbf{x})$ Magnetic vector potential (5.27)

$\mathbf{A}(\mathbf{x}) = \frac{\mu_0}{4\pi}\int\frac{\mathbf{J}(\mathbf{x}')}{|\mathbf{x}-\mathbf{x}'|}d^3x'$

MVP from current dist. (5.32)

(1)