1 Equazioni di Maxwell generali

1.1 Forma Locale

$$\boldsymbol{\nabla} \cdot \vec{\mathbf{D}} = \rho \tag{1}$$

$$\boldsymbol{\nabla} \cdot \vec{\mathbf{B}} = 0 \tag{2}$$

$$\boldsymbol{\nabla} \times \vec{\mathbf{E}} = -\frac{\partial \vec{\mathbf{B}}}{\partial t} \tag{3}$$

$$\boldsymbol{\nabla} \times \vec{\mathbf{H}} = \vec{\mathbf{J}} + \frac{\partial \vec{\mathbf{D}}}{\partial t} \tag{4}$$

1.2 Forma Globale

$$\oint_S \vec{\mathbf{D}} \cdot dS = Q \tag{5}$$

$$\oint_S \vec{\mathbf{B}} \cdot dS = 0 \tag{6}$$

$$\oint_\gamma \vec{\mathbf{E}} \cdot dl = -\frac{\mathrm{d}}{\mathrm{d}t} \int_S \vec{\mathbf{B}} \cdot dS \tag{7}$$

$$\oint_\gamma \vec{\mathbf{H}} \cdot dl = \int_S \vec{\mathbf{J}} \cdot dS + \frac{\mathrm{d}}{\mathrm{d}t} \int_S \vec{\mathbf{D}} \cdot dS \tag{8}$$

$$\tag{9}$$

2 Relazioni tra i vari campi

2.1 Campi

$$\vec{\mathbf{D}} = \epsilon_0 \vec{\mathbf{E}} + \vec{\mathbf{P}} \tag{10}$$

$$\vec{\mathbf{P}} = \chi \epsilon_0 \vec{\mathbf{E}} \tag{11}$$

$$\vec{\mathbf{D}} = \epsilon_0 \epsilon_r \vec{\mathbf{E}} \quad \text{Nei materiali isotropi omogenei} \tag{12}$$

$$\vec{\mathbf{H}} = \vec{\mathbf{B}}/\mu_0 - \vec{\mathbf{M}} \tag{13}$$

2.2 Relazione campi con sorgenti

$$\boldsymbol{\nabla} \cdot \vec{\mathbf{P}} = -\rho_{bounded} \tag{14}$$

$$\vec{\mathbf{P}} \cdot \hat{\mathbf{n}} = \sigma_{bounded} \tag{15}$$

$$\boldsymbol{\nabla} \cdot \vec{\mathbf{D}} = \rho_{free} \tag{16}$$

$$\vec{\mathbf{D}} \cdot \hat{\mathbf{n}} = \sigma_{free} \tag{17}$$

$$\boldsymbol{\nabla} \times \vec{\mathbf{M}} = \vec{\mathbf{J}_{\mathbf{Amp,V}}} \tag{18}$$

$$\vec{\mathbf{M}} \times \hat{\mathbf{n}} = \vec{\mathbf{J}_{\mathbf{Amp,S}}} \tag{19}$$

2.3 Potenziali

$$\vec{\mathbf{B}} = \boldsymbol{\nabla} \times A \tag{20}$$

$$\boldsymbol{\nabla} \times E = -\frac{\mathrm{d}}{\mathrm{d}t}\boldsymbol{\nabla} \times A \tag{21}$$

$$-\boldsymbol{\nabla} V = \vec{\mathbf{E}} + \frac{\partial A}{\partial t} \tag{22}$$