物理…原理 #23 2003 04 水

p.295- §7.2.3. マクスウェル方程式

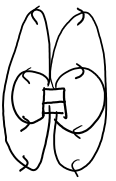
$$\begin{cases} \hat{\varepsilon}_0 \delta \mathbb{E} = -\hat{e} \\ d\mathbb{E} = -\dfrac{\partial \mathbb{B}}{\partial t} \\ d\mathbb{B} = 0 \\ c^2 \hat{\varepsilon}_0 \delta \mathbb{B} = \mathbb{J} + \hat{\varepsilon}_0 \dfrac{\partial \mathbb{E}}{\partial t} \end{cases}$$

$$\mathrm{rot}\, e = -\frac{\partial b}{\partial t}$$

$$e, b : \mathbb{I} \times D \longrightarrow V$$

$$\mathrm{div}\, b = 0$$

$$c^2 \varepsilon_0 \,\mathrm{rot}\, b = j + \varepsilon_0 \frac{\partial e}{\partial t}$$



p.92 Def 2.28

$$T \wedge S = \langle *T, S \rangle \tau_n$$

$T \in \Lambda^p V$

$S \in \Lambda^{n-p} V$.

$\langle , \rangle$: Vの計量

$\wedge$

τ_n : $\Lambda^n V$の基底.

Def. 2.32

$$u \times v := *(u \wedge v).$$

Lem 7.1.

Vの向き

$*$

$T \in \Lambda^3 V$

$u \in V$

$$*(Tu) = T_0 u$$

$Tu \in \Lambda^2 V$

$*(Tu) \in \Lambda^1 V = V$

$T_0 \in \mathbb{R}$

$$c^2 \hat{\varepsilon}_0 \delta \mathbb{B} = \mathbb{J} + \hat{\varepsilon}_0 \frac{\partial \mathbb{E}}{\partial t} \qquad (4.4).$$

$$\hat{\varepsilon}_0 = \varepsilon_0 e_1 \wedge e_2 \wedge e_3.$$

$$*(c^2 \hat{\varepsilon}_0 \delta \mathbb{B}) = *\left(J + \hat{\varepsilon}_0 \frac{\partial \mathbb{E}}{\partial t}\right).$$

$$*\left(\underset{T}{\hat{\varepsilon}_0}\left(\underset{u}{\delta \mathbb{B}}\right)\right) = \underset{T_0}{\varepsilon_0}\left(\underset{u}{\delta \mathbb{B}}\right) \quad \text{☺ Lem 7.1.}$$

$$*\left(\hat{\varepsilon}_0\left(\frac{\partial \mathbb{E}}{\partial t}\right)\right) = \varepsilon_0 \frac{\partial \mathbb{E}}{\partial t}$$

$$c^2 \varepsilon_0 \delta \mathbb{B} = *\mathbb{J} + \varepsilon_0 \frac{\partial \mathbb{E}}{\partial t}$$