そこで、$\begin{cases} \mathbb{E} = \begin{pmatrix} 0 \\ E \\ 0 \end{pmatrix} \sin 2\pi f\left(t - \frac{x}{v}\right) \\ \mathbb{H} = \begin{pmatrix} 0 \\ H_y^\circ \\ H_z^\circ \end{pmatrix} \sin 2\pi f\left(t - \frac{x}{v}\right) \end{cases}$ とおける.

$\mathrm{rot}\,\mathbb{E} + \mu_0 \frac{\partial \mathbb{H}}{\partial t} = 0$ に代入.

$$\mathrm{rot}\,\mathbb{E} = \begin{pmatrix} 0 \\ 0 \\ -2\pi \frac{f}{v} E \cos 2\pi f\left(t - \frac{x}{v}\right) \end{pmatrix}$$

$$\mu_0 \frac{\partial \mathbb{H}}{\partial t} = \mu_0 \begin{pmatrix} 0 \\ 2\pi f H_y^\circ \cos 2\pi f\left(t - \frac{x}{v}\right) \\ 2\pi f H_z^\circ \cos 2\pi f\left(t - \frac{x}{v}\right) \end{pmatrix}$$

$\therefore H_y^\circ = 0$

$\mathbb{E}$, $\mathbb{H}$ は直交

(z成分) $\left(-\frac{E}{v} + H_z^\circ\right) 2\pi f = 0$ $\quad \therefore H_z^\circ = \frac{E}{\mu_0 v}$

$\mathrm{rot}\,\mathbb{H} - \varepsilon_0 \frac{\partial \mathbb{E}}{\partial t} = 0$ に代入.

(省略)

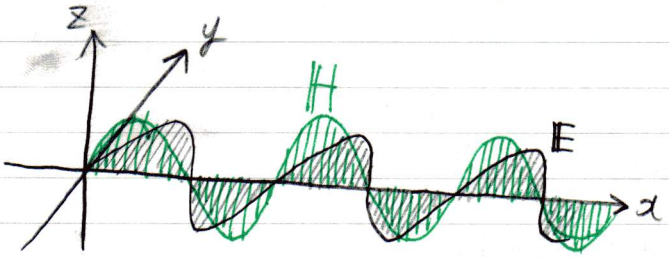
$$2\pi f\left(\varepsilon_0 - \frac{1}{\mu_0 v^2}\right) = 0$$

$\therefore \boxed{v = \frac{1}{\sqrt{\varepsilon_0 \mu_0}}}$

$\to 2.9979 \times 10^8\ \mathrm{m \cdot s^{-1}}$

光速と一致.

光は電磁波



1888 Hertz が発見

電場，磁場の変化が有限の速度で伝わる．

⇓

近接作用の勝利