Im Debattierclub 132
Field SF

Compare the
$\vec{E} = \vec{i}E_x + \vec{j}E_y + \vec{k}E_z$ – "electric field strength"
$\vec{H} = \vec{i}H_x + \vec{j}H_y + \vec{k}H_z$ – "magnetic field strength"
universes with the field equations

****1** ← Maxwellean electrodynamics

$$(\kappa + \varepsilon\frac{\partial}{\partial t})E_x = \begin{vmatrix} \frac{\partial}{\partial y} & \frac{\partial}{\partial z} \\ H_y & H_z \end{vmatrix} ; \; -\mu\frac{\partial}{\partial t}H_x = \begin{vmatrix} \frac{\partial}{\partial y} & \frac{\partial}{\partial z} \\ E_y & E_z \end{vmatrix}$$

$$(\kappa + \varepsilon\frac{\partial}{\partial t})E_y = \begin{vmatrix} \frac{\partial}{\partial z} & \frac{\partial}{\partial x} \\ H_z & H_x \end{vmatrix} ; \; -\mu\frac{\partial}{\partial t}H_y = \begin{vmatrix} \frac{\partial}{\partial z} & \frac{\partial}{\partial x} \\ E_z & E_x \end{vmatrix}$$

$$(\kappa + \varepsilon\frac{\partial}{\partial t})E_z = \begin{vmatrix} \frac{\partial}{\partial x} & \frac{\partial}{\partial y} \\ H_x & H_y \end{vmatrix} ; \; -\mu\frac{\partial}{\partial t}H_z = \begin{vmatrix} \frac{\partial}{\partial x} & \frac{\partial}{\partial y} \\ E_x & E_y \end{vmatrix}$$

$$\varepsilon_0\mu_0 = c^{-2}$$

**2

$$(\kappa+\varepsilon(\alpha\frac{\partial}{\partial t}+\beta\frac{\partial^2}{\partial t^2})E_x=\begin{vmatrix}\frac{\partial}{\partial y} & \frac{\partial}{\partial z}\\ H_y & H_z\end{vmatrix};\ -\mu(\gamma\frac{\partial}{\partial t}+\delta\frac{\partial^2}{\partial t^2})H_x=\begin{vmatrix}\frac{\partial}{\partial y} & \frac{\partial}{\partial z}\\ E_y & E_z\end{vmatrix}$$

$$(\kappa+\varepsilon(\alpha\frac{\partial}{\partial t}+\beta\frac{\partial^2}{\partial t^2})E_y=\begin{vmatrix}\frac{\partial}{\partial z} & \frac{\partial}{\partial x}\\ H_z & H_x\end{vmatrix};\ -\mu(\gamma\frac{\partial}{\partial t}+\delta\frac{\partial^2}{\partial t^2})H_y=\begin{vmatrix}\frac{\partial}{\partial z} & \frac{\partial}{\partial x}\\ E_z & E_x\end{vmatrix}$$

$$(\kappa+\varepsilon(\alpha\frac{\partial}{\partial t}+\beta\frac{\partial^2}{\partial t^2})E_z=\begin{vmatrix}\frac{\partial}{\partial x} & \frac{\partial}{\partial y}\\ H_x & H_y\end{vmatrix};\ -\mu(\gamma\frac{\partial}{\partial t}+\delta\frac{\partial^2}{\partial t^2})H_z=\begin{vmatrix}\frac{\partial}{\partial x} & \frac{\partial}{\partial y}\\ E_x & E_y\end{vmatrix}$$

**3

$$(\kappa+\varepsilon\frac{\partial}{\partial t})E_x=\begin{vmatrix}\frac{\partial^2}{\partial y^2} & \frac{\partial^2}{\partial z^2}\\ H_y & H_z\end{vmatrix};\ -\mu\frac{\partial}{\partial t}H_x=\begin{vmatrix}\frac{\partial^2}{\partial y^2} & \frac{\partial^2}{\partial z^2}\\ E_y & E_z\end{vmatrix}$$

$$(\kappa+\varepsilon\frac{\partial}{\partial t})E_y=\begin{vmatrix}\frac{\partial^2}{\partial z^2} & \frac{\partial^2}{\partial x^2}\\ H_z & H_x\end{vmatrix};\ -\mu\frac{\partial}{\partial t}H_y=\begin{vmatrix}\frac{\partial^2}{\partial z^2} & \frac{\partial^2}{\partial x^2}\\ E_z & E_x\end{vmatrix}$$

$$(\kappa+\varepsilon\frac{\partial}{\partial t})E_z=\begin{vmatrix}\frac{\partial^2}{\partial x^2} & \frac{\partial^2}{\partial y^2}\\ H_x & H_y\end{vmatrix};\ -\mu\frac{\partial}{\partial t}H_z=\begin{vmatrix}\frac{\partial^2}{\partial x^2} & \frac{\partial^2}{\partial y^2}\\ E_x & E_y\end{vmatrix}$$

**4

$$(\kappa+\varepsilon\frac{\partial^2}{\partial t^2})E_x=\begin{vmatrix}\frac{\partial^2}{\partial y^2} & \frac{\partial^2}{\partial z^2}\\ H_y & H_z\end{vmatrix};\ -\mu\frac{\partial^2}{\partial t^2}H_x=\begin{vmatrix}\frac{\partial^2}{\partial y^2} & \frac{\partial^2}{\partial z^2}\\ E_y & E_z\end{vmatrix}$$

$$(\kappa+\varepsilon\frac{\partial^2}{\partial t^2})E_y=\begin{vmatrix}\frac{\partial^2}{\partial z^2} & \frac{\partial^2}{\partial x^2}\\ H_z & H_x\end{vmatrix};\ -\mu\frac{\partial^2}{\partial t^2}H_y=\begin{vmatrix}\frac{\partial^2}{\partial z^2} & \frac{\partial^2}{\partial x^2}\\ E_z & E_x\end{vmatrix}$$

$$(\kappa+\varepsilon\frac{\partial^2}{\partial t^2})E_z=\begin{vmatrix}\frac{\partial^2}{\partial x^2} & \frac{\partial^2}{\partial y^2}\\ H_x & H_y\end{vmatrix};\ -\mu\frac{\partial^2}{\partial t^2}H_z=\begin{vmatrix}\frac{\partial^2}{\partial x^2} & \frac{\partial^2}{\partial y^2}\\ E_x & E_y\end{vmatrix}$$

**5… more variations of **1

esp. regarding the associated engineering world.

References

[1] J.C. Maxwell. A Treatise on Electricity and Magnetism. Vol. 1 and 2. Cambridge University Press, Reprint 2010 ISBN 978-1108014038, ISBN 978-1108014045

[2] https://en.wikipedia.org/wiki/Maxwell%27s_equations

[3] https://en.wikipedia.org/wiki/Euclidean_vector

[4] Y. Nomura. Parallelwelten. Reise ins Quantenmultiversum. Spektrum der Wissenschaft 9.17, S. 13-19, 7 Ref.

23.08.2017 EPSnoct.



Photo by Jonathan Stoschek “You should always venture the impossible.”