11. CLASSICAL MAXWELL ELECTRODYNAMIC EQUATIONS CHARACTERISTICS FROM OBSERVER'S MATHEMATICS POINT OF VIEW

Observer's Mathematics consider classical Maxwell equations **(M1)**, **(M2)**, **(M3)** and **(M4)** as the first approach

So, we have in coordinates (t, x, y, z):

(M1)

$$\partial E_z/\partial y -_n \partial E_y/\partial z = -\frac{1}{c} \times_n \partial H_x/\partial t$$

$$\partial E_x/\partial z -_n \partial E_z/\partial x = -\frac{1}{c} \times_n \partial H_y/\partial t$$

$$\partial E_y/\partial x -_n \partial E_x/\partial y = -\frac{1}{c} \times_n \partial H_z/\partial t$$

We assume that all elements of these equalities belong to W_n.

THEOREM 11.1. *We assume that* $n > 10$ *and*

$$c = 0.33 \times_n 10^{-8}$$

If

$$\partial H_x/\partial t = \pm 0.\underbrace{0\ldots0}_{n-8} a_{n-7}\ldots a_n$$

where $a_{n-7}, \ldots, a_n \in (0, 1, 2, 3, 4, 5, 6, 7, 8, 9)$, *then*

$$\partial E_z/\partial y = \partial E_y/\partial z$$

THEOREM 11.2. *We assume that* $n > 10$ *and*

$$c = 0.33 \times_n 10^{-8}$$

If

$$\partial H_z/\partial t = \pm 0.\underbrace{0\ldots0}_{n-8} b_{n-7}\ldots b_n$$

where $b_{n-7}, \ldots, b_n \in (0, 1, 2, 3, 4, 5, 6, 7, 8, 9)$, *then*

$$\partial E_y/\partial x = \partial E_x/\partial y$$

Theorem 11.3. *We assume that* $n > 10$ *and*

$$c = 0.33 \times_n 10^{-8}$$

If

$$\partial H_y/\partial t = \pm 0.\underbrace{0\ldots0}_{n-8} d_{n-7}\ldots d_n$$

where $d_{n-7},\ldots,d_n \in (0,1,2,3,4,5,6,7,8,9)$, *then*

$$\partial E_x/\partial z = \partial E_z/\partial x$$

Theorem 11.4. *We assume that* $n > 10$ *and*

$$c = 0.33 \times_n 10^{-8}$$

If $\boldsymbol{H}$ *is enough slowly changes by time, then*

$$\partial E_z/\partial y = \partial E_y/\partial z$$

$$\partial E_y/\partial x = \partial E_x/\partial y$$

$$\partial E_x/\partial z = \partial E_z/\partial x$$

We have in coordinates (t,x,y,z):

(M3)

$$\partial H_z/\partial y -_n \partial H_y/\partial z = \frac{1}{c} \times_n \partial E_x/\partial t +_n \frac{4 \times_n \pi}{c} \times_n j_x$$

$$\partial H_x/\partial z -_n \partial H_z/\partial x = \frac{1}{c} \times_n \partial E_y/\partial t +_n \frac{4 \times_n \pi}{c} \times_n j_y$$

$$\partial H_y/\partial x -_n \partial H_x/\partial y = \frac{1}{c} \times_n \partial E_z/\partial t +_n \frac{4 \times_n \pi}{c} \times_n j_z$$

Let's remind the number π here is a standard π, but with only n digits in the decimal part of the fraction:

$$\pi = 3.\underbrace{14\ldots}_{n}$$

We assume that all elements of these equalities belong to W_n.

Theorem 11.5. *We assume that* $n > 10$ *and*

$$c = 0.33 \times_n 10^{-8}$$

If

$$\partial E_x/\partial t = \pm 0.\underbrace{0\ldots0}_{n-8} f_{n-7}\ldots f_n$$

where $f_{n-7},\ldots,f_n \in (0,1,2,3,4,5,6,7,8,9)$,
and

$$j_x = \pm 0.\underbrace{0\ldots0}_{n-7} g_{n-6}\ldots g_n$$

where $g_{n-6},\ldots,g_n \in (0,1,2,3,4,5,6,7,8,9)$,
then

$$\partial H_z/\partial y = \partial H_y/\partial z$$

THEOREM 11.6. *We assume that* $n > 10$ *and*

$$c = 0.33 \times_n 10^{-8}$$

If

$$\partial E_z/\partial t = \pm 0.\underbrace{0\ldots0}_{n-8} h_{n-7}\ldots h_n$$

where $h_{n-7},\ldots,h_n \in (0,1,2,3,4,5,6,7,8,9)$,
and

$$j_z = \pm 0.\underbrace{0\ldots0}_{n-7} k_{n-6}\ldots k_n$$

where $k_{n-6},\ldots,k_n \in (0,1,2,3,4,5,6,7,8,9)$,
then

$$\partial H_y/\partial x = \partial H_x/\partial y$$

THEOREM 11.7. *We assume that* $n > 10$ *and*

$$c = 0.33 \times_n 10^{-8}$$

If

$$\partial E_y/\partial t = \pm 0.\underbrace{0\ldots0}_{n-8} l_{n-7}\ldots l_n$$

where $l_{n-7},\ldots,l_n \in (0,1,2,3,4,5,6,7,8,9)$,
and

$$j_y = \pm 0.\underbrace{0\ldots0}_{n-7} m_{n-6}\ldots m_n$$

where $m_{n-6}, \ldots, m_n \in (0,1,2,3,4,5,6,7,8,9)$,

then

$$\partial H_x/\partial z = \partial H_z/\partial x$$

THEOREM 11.8. *We assume that* $n > 10$ *and*

$$c = 0.33 \times_n 10^{-8}$$

If $\boldsymbol{E}$ *is enough slowly changes by time and* $\boldsymbol{j}$ *is small enough, then*

$$\partial H_z/\partial y = \partial H_y/\partial z$$

$$\partial H_y/\partial x = \partial H_x/\partial y$$

$$\partial H_x/\partial z = \partial H_z/\partial x$$

THEOREM 11.9. *We assume that* $n > 10$ *and*

$$c = 0.33 \times_n 10^{-8}$$

If

$$\partial E_z/\partial y = \partial E_y/\partial z$$

then

$$\partial H_x/\partial t = \pm 0.\underbrace{0\ldots0}_{n-8} a_{n-7}\ldots a_n$$

where $a_{n-7}, \ldots, a_n \in (0,1,2,3,4,5,6,7,8,9)$ *are the random variables.*

THEOREM 11.10. *We assume that* $n > 10$ *and*

$$c = 0.33 \times_n 10^{-8}$$

If

$$\partial E_y/\partial x = \partial E_x/\partial y$$

then

$$\partial H_z/\partial t = \pm 0.\underbrace{0\ldots0}_{n-8} b_{n-7}\ldots b_n$$

where $b_{n-7}, \ldots, b_n \in (0,1,2,3,4,5,6,7,8,9)$ *are the random variables.*

THEOREM 11.11. *We assume that* $n > 10$ *and*

$$c = 0.33 \times_n 10^{-8}$$

If

$$\partial E_x/\partial z = \partial E_z/\partial x$$

then

$$\partial H_y/\partial t = \pm 0.\underbrace{0\ldots0}_{n-8} d_{n-7}\ldots d_n$$

where $d_{n-7},\ldots,d_n \in (0,1,2,3,4,5,6,7,8,9)$ *are the random variables.*

THEOREM 11.12. *We assume that* $n > 10$ *and*

$$c = 0.33 \times_n 10^{-8}$$

If

$$\partial E_z/\partial y = \partial E_y/\partial z$$

$$\partial E_y/\partial x = \partial E_x/\partial y$$

$$\partial E_x/\partial z = \partial E_z/\partial x$$

then $\boldsymbol{H}$ *is a random vector enough slowly changes by time (randomness starts from* $(n-7)^{th}$ *digit in the decimal part of the each coordinate fraction)*

THEOREM 11.13. *We assume that* $n > 10$ *and*

$$c = 0.33 \times_n 10^{-8}$$

If

$$\partial H_z/\partial y = \partial H_y/\partial z$$

and if $\partial E_x/\partial t$ *and* j_x *have the same sign, then*

$$\partial E_x/\partial t = \pm 0.\underbrace{0\ldots0}_{n-8} f_{n-7}\ldots f_n$$

where $f_{n-7},\ldots,f_n \in (0,1,2,3,4,5,6,7,8,9)$ *are the random variables,*

and

$$j_x = \pm 0.\underbrace{0\ldots0}_{n-7} g_{n-6}\ldots g_n$$

where $g_{n-6},\ldots,g_n \in (0,1,2,3,4,5,6,7,8,9)$ *are the random variables.*

THEOREM 11.14. *We assume that* $n > 10$ *and*

$$c = 0.33 \times_n 10^{-8}$$

If

$$\partial H_z/\partial y = \partial H_y/\partial z$$

and if

$$\partial E_x/\partial t = \pm 0.\underbrace{0\ldots0}_{n-8} f_{n-7}\ldots f_n$$

where $f_{n-7}, \dots, f_n \in (0,1,2,3,4,5,6,7,8,9)$,

then

$$j_x = \pm 0.\underbrace{0\dots0}_{n-7} g_{n-6}\dots g_n$$

where $g_{n-6}, \dots, g_n \in (0,1,2,3,4,5,6,7,8,9)$ *are the random variables.*

THEOREM 11.15. *We assume that* $n > 10$ *and*

$$c = 0.33 \times_n 10^{-8}$$

If

$$\partial H_z/\partial y = \partial H_y/\partial z$$

and if

$$j_x = \pm 0.\underbrace{0\dots0}_{n-7} g_{n-6}\dots g_n$$

where $g_{n-6}, \dots, g_n \in (0,1,2,3,4,5,6,7,8,9)$,

then

$$\partial E_x/\partial t = \pm 0.\underbrace{0\dots0}_{n-8} f_{n-7}\dots f_n$$

where $f_{n-7}, \dots, f_n \in (0,1,2,3,4,5,6,7,8,9)$ *are the random variables.*

THEOREM 11.16. *We assume that* $n > 10$ *and*

$$c = 0.33 \times_n 10^{-8}$$

If

$$\partial H_y/\partial x = \partial H_x/\partial y$$

and if $\partial E_z/\partial t$ *and* j_z *have the same sign, then*

$$\partial E_z/\partial t = \pm 0.\underbrace{0\dots0}_{n-8} h_{n-7}\dots h_n$$

where $h_{n-7}, \dots, h_n \in (0,1,2,3,4,5,6,7,8,9)$ *are the random variables,*

and

$$j_z = \pm 0.\underbrace{0\dots0}_{n-7} k_{n-6}\dots k_n$$

where $k_{n-6}, \dots, k_n \in (0,1,2,3,4,5,6,7,8,9)$ *are the random variables.*

THEOREM 11.17. *We assume that* $n > 10$ *and*

$$c = 0.33 \times_n 10^{-8}$$

If

$$\partial H_y/\partial x = \partial H_x/\partial y$$

and if

$$\partial E_z/\partial t = \pm 0.\underbrace{0\ldots 0}_{n-8}h_{n-7}\ldots h_n$$

where $h_{n-7},\ldots,h_n \in (0,1,2,3,4,5,6,7,8,9)$, *then*

$$j_z = \pm 0.\underbrace{0\ldots 0}_{n-7}k_{n-6}\ldots k_n$$

where $k_{n-6},\ldots,k_n \in (0,1,2,3,4,5,6,7,8,9)$ *are the random variables.*

THEOREM 11.18. *We assume that* $n > 10$ *and*

$$c = 0.33 \times_n 10^{-8}$$

If

$$\partial H_y/\partial x = \partial H_x/\partial y$$

and if

$$j_z = \pm 0.\underbrace{0\ldots 0}_{n-7}k_{n-6}\ldots k_n$$

where $k_{n-6},\ldots,k_n \in (0,1,2,3,4,5,6,7,8,9)$, *then*

$$\partial E_z/\partial t = \pm 0.\underbrace{0\ldots 0}_{n-8}h_{n-7}\ldots h_n$$

where $h_{n-7},\ldots,h_n \in (0,1,2,3,4,5,6,7,8,9)$ *are the random variables.*

THEOREM 11.19. *We assume that* $n > 10$ *and*

$$c = 0.33 \times_n 10^{-8}$$

If

$$\partial H_x/\partial z = \partial H_z/\partial x$$

and if $\partial E_y/\partial t$ *and* j_z *have the same sign, then*

$$\partial E_y/\partial t = \pm 0.\underbrace{0\ldots 0}_{n-8}l_{n-7}\ldots l_n$$

where $l_{n-7},\ldots,l_n \in (0,1,2,3,4,5,6,7,8,9)$ *are the random variables,*

and

$$j_y = \pm 0.\underbrace{0\ldots0}_{n-7} m_{n-6}\ldots m_n$$

where $m_{n-6},\ldots,m_n \in (0,1,2,3,4,5,6,7,8,9)$ *are the random variables.*

THEOREM 11.20. *We assume that* $n > 10$ *and*

$$c = 0.33 \times_n 10^{-8}$$

If

$$\partial H_x/\partial z = \partial H_z/\partial x$$

and if

$$\partial E_y/\partial t = \pm 0.\underbrace{0\ldots0}_{n-8} l_{n-7}\ldots l_n$$

where $l_{n-7},\ldots,l_n \in (0,1,2,3,4,5,6,7,8,9)$, *then*

$$j_y = \pm 0.\underbrace{0\ldots0}_{n-7} m_{n-6}\ldots m_n$$

where $m_{n-6},\ldots,m_n \in (0,1,2,3,4,5,6,7,8,9)$ *are the random variables.*

THEOREM 11.21. *We assume that* $n > 10$ *and*

$$c = 0.33 \times_n 10^{-8}$$

If

$$\partial H_x/\partial z = \partial H_z/\partial x$$

and if

$$j_y = \pm 0.\underbrace{0\ldots0}_{n-7} m_{n-6}\ldots m_n$$

where $m_{n-6},\ldots,m_n \in (0,1,2,3,4,5,6,7,8,9)$, *then*

$$\partial E_y/\partial t = \pm 0.\underbrace{0\ldots0}_{n-8} l_{n-7}\ldots l_n$$

where $l_{n-7},\ldots,l_n \in (0,1,2,3,4,5,6,7,8,9)$ *are the random variables.*

THEOREM 11.22. *We assume that* $n > 10$ *and*

$$c = 0.33 \times_n 10^{-8}$$

If

$$\partial H_z/\partial y = \partial H_y/\partial z$$

$$\partial H_y/\partial x = \partial H_x/\partial y$$

$$\partial H_x/\partial z = \partial H_z/\partial x$$

and if we have corresponding "smallest" conditions of theorems 5.13 - 5.21 above, then

E *is a slow changing random vector (randomness starts from* $(n-7)^{th}$ *digit in the decimal part of the each coordinate fraction), or* ***j*** *is a small random vector (randomness starts from* $(n-6)^{th}$ *digit in the decimal part of the each coordinate fraction), or both* ***E*** *and* ***j*** *are the slow changing random vectors.*