The sixth Dimension

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ABSTRACT

Assume mass and electric current are Fifth and sixth dimensions in Special Relativity and Redefinition of the point as a circle. According to Einstein's first hypothesis only ، it can be reached to transfer formats between reference frames in the special theory of relativity

Keywords

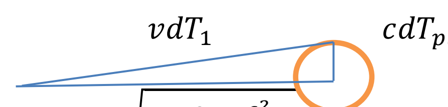
The fifth dimension, the sixth dimension,

Introduction

Redefinition of the point

Redefinition of the point as a circle the length of it the radius Equal the length of the Planck cT_{pl}

SO $$dX_1 = vdT_1\sqrt{1 - \frac{v^2}{C^2}(1 - (\frac{dX_{PL}^2}{dX_1{}^2})}$$



$$dX_1 = v\sqrt{dT_1{}^2 - \frac{c^2}{v^2}(dT_{pl}^2)}$$

$$dX_1 = vdT_1\sqrt{1 - \frac{c^2}{v^2}\left(\frac{dT_{PL}^2}{dT_1{}^2}\right)}$$

$$dX_1 = vdT_1\sqrt{1 - \frac{v^2}{C^2}(1 - (\frac{dX_{PL}^2}{dX_1{}^2})}$$

contribution

Consider two observers A , B *in both frames* S_1 , S_2

At first $dT_1 = dT_2 = 0$

T_1 *The time at frame* S_1 *and* T_2 *the time at frame* S_2

Let A and B in the same place and at the same time, they each send a light signal

Let S_2 *and (observer B) moving respect to* S_1 *and (observer A) with uniform Velocity* $\vec{V}$

At the direction of the axis $\overrightarrow{ox}$

In this case the signal is spread as a spherical wave

Measurements A:

At moment dT_1 *of his watch, the wave equation appears in the Formula:*

$$dX_1{}^2 + dY_1{}^2 + dZ_1{}^2 - C_1{}^2 dT_1{}^2 - \frac{G_1{}^2}{C_{M1}{}^4} dM_1{}^2 - \frac{K_{e1}\hbar_1\, G_1{}^2}{C_{I1}{}^9} dI_1{}^2 = 0 \quad \text{-------------------------------- (1)}$$

C_1 *Speed of light,* C_{M1} *Speed of light at mass dimension at frame* S_1

And C_{I1} *Speed of light at church dimension at frame* S_1

Measurements B:

At moment T_2 *of his watch, the wave equation appears in the Formula:*

$$dX_2{}^2 + dY_2{}^2 + dZ_2{}^2 - C_2{}^2 dT_2{}^2 - \frac{G_2{}^2}{C_{M2}{}^4} dM_2{}^2 - \frac{K_{e2}\hbar_2\, G_2{}^2}{C_{I2}{}^9} dI_2{}^2 = 0 \quad \text{-------------------------------- (2)}$$

C_2 *Speed of light and* C_{M2} *Speed of light at mass dimension at frame* S_2

And C_{I2} *Speed of light at church dimension at frame* S_2

Notice $C_1 \neq C_2$

Then

$$dX_1{}^2 + dY_1{}^2 + dZ_1{}^2 - C_1{}^2 dT_1{}^2 - \frac{G_1{}^2}{C_{M1}{}^4} dM_1{}^2 - \frac{K_{e1}\hbar_1\, G_1{}^2}{C_{I1}{}^9} dI_1{}^2 =$$

$$dX_2{}^2 + dY_2{}^2 + dZ_2{}^2 - C_2{}^2 dT_2{}^2 - \frac{G_2{}^2}{C_{M2}{}^4} dM_2{}^2 - \frac{K_{e2}\hbar_2\, G_2{}^2}{C_{I2}{}^9} dI_2{}^2 \quad \text{-------------------------------- (3)}$$

Let $dY_1 = dY_2$ *and* $dZ_1 = dZ_2$

So

$$dX_1{}^2 - C_1{}^2 dT_1{}^2 - \frac{G_1{}^2}{C_{M1}{}^4} dM_1{}^2 - \frac{K_{e1}\hbar_1\, G_1{}^2}{C_{I1}{}^9} dI_1{}^2 =$$

$dX_2{}^2 - C_2{}^2 dT_2{}^2 - \frac{G_2{}^2}{C_{M2}{}^4} dM_2{}^2 - \frac{K_{e2}\hbar_2\, G_2{}^2}{C_{I2}{}^9} dI_2{}^2$ -------------------------------- *(4)*

Let

$dX_2 = G_{11}\, dX_1 + G_{14}\, dT_1 + G_{15}\, dM_1 + G_{16}\, dI_1$ -------------------------------- *(5)*

$dT_2 = G_{41}\, dX_1 + G_{44}\, dT_1 + G_{45}\, dM_1 + G_{46}\, dI_1$ -------------------------------- *(6)*

$dM_2 = G_{51}\, dX_1 + G_{54}\, dT_1 + G_{55}\, dM_1 + G_{56}\, dI_1$ -------------------------------- *(7)*

$dI_2 = G_{61}\, dX_1 + G_{64}\, dT_1 + G_{65}\, dM_1 + G_{66}\, dI_1$ -------------------------------- *(8)*

Where G_{11} *,* G_{14}*,* G_{15}*,* G_{16} *,* G_{41}*,* G_{44}*,* G_{45} *,* G_{46}*,* $G_{51.}$*,* G_{54}*,* $G_{55.}$*,* G_{56} *,* G_{61}*,* $G_{64.}$*,* G_{65}*,* $G_{66.}$ *are constants*

Consider the moving of origin point O_2 *respect to* S_1

(Ordinates O_2 *) is* dX_2*=0*

So from equation (5)

$dX_2 = G_{11}\, dX_1 + G_{14}\, dT_1 + G_{15}\, dM_1 + G_{16}\, dI_1$ -------------------------------- *(5)*

$0 = G_{11}\, dX_1 + G_{14}\, dT_1 + G_{15}\, dM_1 + G_{16}\, dI_1$

$G_{14}\, dT_1 = -G_{11}\, dX_1 - G_{15}\, dM_1 - G_{16}\, dI_1$

$G_{14} = -G_{11} \frac{dX_1}{dT_1} - G_{15} \frac{dM_1}{dT_1} - G_{16} \frac{dI_1}{dT_1}$ *And* $\frac{dX_1}{dT_1} = v\sqrt{1 - \frac{\boldsymbol{C_1}^2}{v^2}\left(\frac{dT_{PL}^2}{dT_1{}^2}\right)}$

So $G_{14} = -G_{11}\, v\sqrt{1 - \frac{\boldsymbol{C_1}^2}{v^2}\left(\frac{dT_{PL}^2}{dT_1{}^2}\right)} - G_{15} \frac{dM_1}{dT_1} - G_{16} \frac{dI_1}{dT_1}$ -------------------------------- *(9)*

Consider the moving of origin point O_1 *respect to* S_2

(Ordinates O_1 *) is* dX_1*=0*

So from equation (5)

$dX_2 = G_{11}\, dX_1 + G_{14}\, dT_1 + G_{15}\, dM_1 + G_{16}\, dI_1$ -------------------------------- *(5)*

$dX_2 = 0 + G_{14}\, dT_1 + G_{15}\, dM_1 + G_{16}\, dI_1$

$dX_2 = G_{14}\, dT_1 + G_{15}\, dM_1 + G_{16}\, dI_1$ -------------------------------- *(10)*

From equation (6)

$dT_2 = G_{41}\, dX_1 + G_{44}\, dT_1 + G_{45}\, dM_1 + G_{46}\, dI_1$ -------------------------------- *(6)*

$dT_2 = 0 + G_{44}\, dT_1 + G_{45}\, dM_1 + G_{46}\, dI_1$

$dT_2 = G_{44}\, dT_1 + G_{45}\, dM_1 + G_{46}\, dI_1$ -------------------------------- *(11)*

From equation (8) and (9)

$$\frac{dX_2}{dT_2} = \frac{G_{14}\, dT_1 + G_{15}\, dM_1 + G_{16}\, dI_1}{G_{44}\, dT_1 + G_{45}\, dM_1 + G_{46}\, dI_1} \quad And \quad \frac{dX_2}{dT_2} = -v\sqrt{1 - \frac{\boldsymbol{C_1}^2}{v^2}\left(\frac{dT_{PL}^2}{dT_1{}^2}\right)}$$

$$So\ \frac{G_{14}\, dT_1 + G_{15}\, dM_1 + G_{16}\, dI_1}{G_{44}\, dT_1 + G_{45}\, dM_1 + G_{46}\, dI_1} = -v\sqrt{1 - \frac{\boldsymbol{C_1}^2}{v^2}\left(\frac{dT_{PL}^2}{dT_1{}^2}\right)}$$

From equation (7)

$$G_{14} = -G_{11}\, v\sqrt{1 - \frac{\boldsymbol{C_1}^2}{v^2}\left(\frac{dT_{PL}^2}{dT_1{}^2}\right)} - G_{15}\, \frac{dM_1}{dT_1} - G_{16}\, \frac{dq_1}{dT_1} \text{ -------------------------------- (9)}$$

So

$$\frac{G_{14}\, dT_1 + G_{15}\, dM_1 + G_{16}\, dI_1}{G_{44}\, dT_1 + G_{45}\, dM_1 + G_{46}\, dI_1} = -v\sqrt{1 - \frac{\boldsymbol{C_1}^2}{v^2}\left(\frac{dT_{PL}^2}{dT_1{}^2}\right)}$$

$$\frac{-G_{11}\, v dT_1 \sqrt{1 - \frac{\boldsymbol{C_1}^2}{v^2}\left(\frac{dT_{PL}^2}{dT_1{}^2}\right)} - G_{15}\, dM_1 - G_{16}\, dI_1 + G_{15}\, M_{1} + G_{16}\, dI_1}{G_{44}\, dT_1 + G_{45}\, dM_1 + G_{46}\, dI_1} = -v\sqrt{1 - \frac{\boldsymbol{C_1}^2}{v^2}\left(\frac{T_{PL}^2}{T_1{}^2}\right)}$$

$$\frac{-G_{11}\, v dT_1 \sqrt{1 - \frac{\boldsymbol{C_1}^2}{v^2}\left(\frac{dT_{PL}^2}{dT_1{}^2}\right)}}{G_{44}\, dT_1 + G_{45}\, dM_1 + G_{46}\, dI_1} = -v\sqrt{1 - \frac{\boldsymbol{C_1}^2}{v^2}\left(\frac{dT_{PL}^2}{dT_1{}^2}\right)}$$

$$\frac{G_{11}\, dT_1}{G_{44}\, dT_1 + G_{45}\, dM_1 + G_{46}\, dI_1} \quad 1$$

$$G_{44}\, dT_1 + G_{45}\, dM_1 + G_{46}\, dI_1 = G_{11}\, dT_1$$

$$G_{44} = G_{11} - G_{45}\, \frac{dM_1}{dT_1} - G_{46}\, \frac{dI_1}{dT_1} \text{-------------------------------- (12)}$$

From equations (6), (7)

$dT_2 = G_{41}\, dX_1 + G_{44}\, dT_1 + G_{45}\, dM_1 + G_{46}\, dI_1$ -------------------------------- *(6)*

$dM_2 = G_{51}\, dX_1 + G_{54}\, dT_1 + G_{55}\, dM_1 + G_{56}\, dI_1$ -------------------------------- *(7)*

$dX_1 = 0$

$dT_2 = G_{44}\, dT_1 + G_{45}\, dM_1 + G_{46}\, dI_1$

$dM_2 = G_{54}\, dT_1 + G_{55}\, dM_1 + G_{56}\, dI_1$

So

$$\frac{dM_2}{dT_2} = \frac{G_{54}\, dT_1 + G_{55}\, dM_1 + G_{56}\, dI_1}{G_{44}\, dT_1 + G_{45}\, dM_1 + G_{46}\, dI_1} \quad And \quad \frac{dM_2}{dT_2} = \frac{dM_1}{dT_1}$$

$$\frac{dM_2}{dT_2} = \frac{G_{54}\, dT_1 + G_{55}\, dM_1 + G_{56}\, dI_1}{G_{44}\, dT_1 + G_{45}\, dM_1 + G_{46}\, dI_1}$$

$$\frac{dM_2}{dT_2} = \frac{G_{54} + G_{55}\, \frac{dM_1}{dT_1} + G_{55}\, \frac{dI_1}{dT_1}}{G_{44} + G_{45}\, \frac{M_1}{T_1} + G_{46}\, \frac{dI_1}{dT_1}}$$

From

$$G_{44} = G_{11} - G_{45}\, \frac{dM_1}{dT_1} - G_{46}\, \frac{dq_1}{dT_1} \text{-------------------------------- } (12)$$

$$\frac{dM_2}{dT_2} = \frac{G_{54} + G_{55}\, \frac{dM_1}{dT_1} + G_{55}\, \frac{dI_1}{dT_1}}{G_{11} - G_{45}\, \frac{dM_1}{dT_1} - G_{46}\, \frac{dI_1}{dT_1} + G_{45}\, \frac{M_1}{T_1} + G_{46}\, \frac{dI_1}{dT_1}}$$

$$\frac{dM_2}{dT_2} = \frac{G_{54} + G_{55}\, \frac{dM_1}{dT_1} + G_{55}\, \frac{dI_1}{dT_1}}{G_{11}}$$

$$G_{54} + G_{55}\, \frac{dM_1}{dT_1} + G_{55}\, \frac{dI_1}{dT_1} = G_{11}\, \frac{dM_2}{dT_2}$$

$$G_{54} = G_{11}\, \frac{dM_2}{dT_2} - G_{55}\, \frac{dM_1}{dT_1} - G_{55}\, \frac{dI_1}{dT_1} \text{-------------------------------- } (13)$$

From (5), (9)

$$dX_2 = G_{11}\, dX_1 + G_{14}\, dT_1 + G_{15}\, dM_1 + G_{16}\, dI_1 \quad \text{-------------------------------- } (5)$$

$$G_{14} = -G_{11}\, v \sqrt{1 - \frac{C_1^{\,2}}{v^2} \left(\frac{dT_{PL}^2}{dT_1^{\,2}}\right)} - G_{15}\, \frac{dM_1}{dT_1} - G_{16}\, \frac{dI_1}{dT_1} \quad \text{-------------------------------- } (9)$$

$$dX_2 = G_{11}\, dX_1 - G_{11}\, v dT_1 \sqrt{1 - \frac{C_1^{\,2}}{v^2} \left(\frac{dT_{PL}^2}{dT_1^{\,2}}\right)} - G_{15}\, dM_1 - G_{16}\, dI_1 + G_{15}\, dM_1 + G_{16}\, dI_1 \quad \text{------------------ } (14)$$

$$dX_2 = G_{11}\, dX_1 - G_{11}\, v dT_1 \sqrt{1 - \frac{C_1^{\,2}}{v^2} \left(\frac{dT_{PL}^2}{dT_1^{\,2}}\right)}$$

$$dX_2 = G_{11}\left[dX_1 - v dT_1 \sqrt{1 - \frac{C_1^{\,2}}{v^2} \left(\frac{dT_{PL}^2}{dT_1^{\,2}}\right)}\;\right] \text{------------------ } (15)$$

From (6), (12)

$$dT_2 = G_{41}\,dX_1 + G_{44}\,dT_1 + G_{45}\,dM_1 + G_{46}\,dI_1 \quad \text{--------------------------------} \; (6)$$

$$G_{44} = G_{11} - G_{45}\,\frac{dM_1}{dT_1} - G_{46}\,\frac{dI_1}{dT_1} \text{--------------------------------} \; (12)$$

$$dT_2 = G_{41}\,dX_1 + G_{11}\,dT_1 - G_{45}\,dM_1 - G_{46}\,dI_1 + G_{45}\,dM_1 + G_{46}\,dI_1$$

$$dT_2 = G_{41}\,dX_1 + G_{11}\,dT_1 \text{--------------------------------} \; (16)$$

From (7), (13)

$$dM_2 = G_{51}\,dX_1 + G_{54}\,dT_1 + G_{55}\,dM_1 + G_{56}\,dI_1 \quad \text{--------------------------------} \; (7)$$

$$G_{54} = G_{11}\,\frac{dM_2}{dT_2} - G_{55}\,\frac{dM_1}{dT_1} - G_{55}\,\frac{dI_1}{dT_1} \text{--------------------------------} \; (13)$$

$$dM_2 = G_{51}\,dX_1 + G_{54}\,dT_1 + G_{55}\,dM_1 + G_{56}\,dI_1$$

$$dM_2 = G_{51}\,dX_1 + G_{11}\,dM_1 - G_{55}\,dM_1 - G_{56}\,dI_1 + G_{55}\,dM_1 + G_{56}\,dI_1$$

$$dM_2 = G_{51}\,dX_1 + G_{11}\,dM_1 \text{--------------------------------} \; (17)$$

From (6), (8)

$$dT_2 = G_{41}\,dX_1 + G_{44}\,dT_1 + G_{45}\,dM_1 + G_{46}\,dI_1 \quad \text{--------------------------------} \; (6)$$

$$dI_2 = G_{61}\,dX_1 + G_{64}\,dT_1 + G_{65}\,dM_1 + G_{66}\,dI_1 \quad \text{--------------------------------} \; (8)$$

$$dX_1 = 0$$

$$dT_2 = G_{44}\,dT_1 + G_{45}\,dM_1 + G_{46}\,dI_1$$

$$dI_2 = G_{64}\,dT_1 + G_{65}\,dM_1 + G_{66}\,dI_1$$

$$\frac{dI_2}{dT_2} = \frac{G_{64}\,dT_1 + G_{65}\,dM_1 + G_{66}\,dI_{1_2}}{G_{44}\,dT_1 + G_{45}\,dM_1 + G_{46}\,dI_1} \text{ and } \frac{dI_2}{dT_2} = \frac{dI_1}{dT_1}$$

$$\frac{dI_1}{dT_1} = \frac{G_{64} + G_{65}\,\dfrac{dM_1}{dT_1} + G_{66}\,\dfrac{dI_1}{dT_1}}{G_{44} + G_{45}\,\dfrac{dM_1}{dT_1} + G_{46}\,\dfrac{dI_1}{dT_1}}$$

From

$$G_{44} = G_{11} - G_{45}\,\frac{dM_1}{dT_1} - G_{46}\,\frac{dI_1}{dT_1} \text{--------------------------------} \; (12)$$

$$\frac{dI_1}{dT_1} = \frac{G_{64} + G_{65}\frac{dM_1}{dT_1} + G_{66}\frac{dI_1}{dT_1}}{G_{11} - G_{45}\frac{dM_1}{dT_1} - G_{46}\frac{dI_1}{dT_1} + G_{45}\frac{dM_1}{dT_1} + G_{46}\frac{dI_1}{dT_1}}$$

$$\frac{dI_1}{dT_1} = \frac{G_{64} + G_{65}\frac{dM_1}{dT_1} + G_{66}\frac{dI_1}{dT_1}}{G_{11}}$$

$$G_{64} + G_{65}\frac{dM_1}{dT_1} + G_{66}\frac{dI_1}{dT_1} = G_{11}\frac{dI_1}{dT_1}$$

$G_{64} = G_{11}\frac{dI_1}{dT_1} - G_{65}\frac{dM_1}{dT_1} - G_{66}\frac{dI_1}{dT_1}$-------------------------------- *(18)*

From (8), (18)

$dI_2 = G_{61}\, dX_1 + G_{64}\, dT_1 + G_{65}\, dM_1 + G_{66}\, dI_1$ -------------------------------- *(8)*

$G_{64} = G_{11}\frac{dI_1}{dT_1} - G_{65}\frac{dM_1}{dT_1} - G_{66}\frac{dI_1}{dT_1}$-------------------------------- *(18)*

$$dI_2 = G_{61}\, dX_1 + G_{11}\, dq_1 - G_{65}\, dM_1 - G_{66}\, dI_1 + G_{65}\, dM_1 + G_{66}\, dI_1$$

$dI_2 = G_{61}\, dX_1 + G_{11}\, dI_1$-------------------------------- *(19)*

$$\boldsymbol{dX_1{}^2 - C_1{}^2 dT_1{}^2 - \frac{G_1{}^2}{C_{M1}{}^4} dM_1{}^2 - \frac{K_{e1}\hbar_1\, G_1{}^2}{C_{I1}{}^9} dI_1{}^2 =}$$

$\boldsymbol{dX_2{}^2 - C_2{}^2 dT_2{}^2 - \frac{G_2{}^2}{C_{M2}{}^4} dM_2{}^2 - \frac{K_{e2}\hbar_2\, G_2{}^2}{C_{I2}{}^9} dI_2{}^2}$-------------------------------- ***(4)***

From (15), (16), (17), (19)

$dX_2 = G_{11}\, [dX_1 - v dT_1\sqrt{1 - \frac{C_1{}^2}{v^2}(\frac{dT_{PL}^2}{dT_1{}^2})}\ ]$ ------------------ *(15)*

$dT_2 = G_{41}\, dX_1 + G_{11}\, dT_1$------------------------------- *(16)*

$dM_2 = G_{51}\, dX_1 + G_{11}\, dM_1$ − − − − − − − − (17)

$dI_2 = G_{61}\, dX_1 + G_{11}\, dI_1$-------------------------------- *(19)*

$$dX_1{}^2 - C_1{}^2 dT_1{}^2 - \frac{G_1{}^2}{C_{M1}{}^4} dM_1{}^2 - \frac{\boldsymbol{K_{e1}\hbar_1 G_1{}^2}}{\boldsymbol{C_{I1}{}^9}} \boldsymbol{dI_1{}^2}$$

$$= (G_{11}\,[X_1 - vT_1\sqrt{1 - \frac{C_1{}^2}{v^2}\left(\frac{T_{PL}^2}{T_1{}^2}\right)}])^{\,2} - C_2{}^2(G_{41}\,X_1 + G_{11}\,T_1)^2 - \frac{G_2{}^2}{C_{M2}{}^4}(G_{51}\,X_1 + G_{11}\,M_1)^2$$

$$- \frac{\boldsymbol{K_{e2}\hbar_2 G_2{}^2}}{\boldsymbol{C_{I2}{}^9}} dI_2{}^2(G_{61}\,dX_1 + G_{11}\,dI_1)^2$$

-------------------------------- *(20)*

Compare the coefficient of $dX_1{}^2$

$$1 = G_{11}{}^2 - C_2{}^2(G_{41})^2 - \frac{\boldsymbol{G_2{}^2}}{\boldsymbol{C_{M2}{}^4}}(G_{51})^2$$

$$G_{11}{}^2 = 1 + C_2{}^2(G_{41})^2 + \frac{\boldsymbol{G_2{}^2}}{\boldsymbol{C_{M2}{}^4}}(G_{51})^2$$

-------------------------------- *(21)*

Compare the coefficient of $dX_1 dT_1$

$$0 = -2v\sqrt{1 - \frac{\boldsymbol{C_1}^2}{v^2}(\frac{dT_{PL}^2}{dT_1{}^2})}G_{11}{}^2 - 2C_2{}^2(G_{41}\,G_{11})$$

$$0 = v\sqrt{1 - \frac{\boldsymbol{C_1}^2}{v^2}(\frac{dT_{PL}^2}{dT_1{}^2})}G_{11}{}^2 + C_2{}^2(G_{41}\,G_{11})$$

$$v\sqrt{1 - \frac{\boldsymbol{C_1}^2}{v^2}(\frac{dT_{PL}^2}{dT_1{}^2})}G_{11}{}^2 = -C_2{}^2(G_{41}\,G_{11})$$

$$v\sqrt{1 - \frac{\boldsymbol{C_1}^2}{v^2}(\frac{dT_{PL}^2}{dT_1{}^2})}G_{11} = -C_2{}^2(G_{41})$$

$$G_{11} = \frac{-C_2{}^2}{v\sqrt{1 - \frac{\boldsymbol{C_1}^2}{v^2}(\frac{dT_{PL}^2}{dT_1{}^2})}}(G_{41})$$

$$G_{41} = \frac{-v\sqrt{1 - \frac{\boldsymbol{C_1}^2}{v^2}(\frac{dT_{PL}^2}{dT_1{}^2})}}{C_2{}^2}(G_{11})$$ -------------------------------- *(22)*

$dT_2 = G_{41}\,dX_1 + G_{11}\,dT_1$-------------------------------- *(16)*

$$dT_2 = \frac{-v\sqrt{1-\frac{C_1{}^2}{v^2}(\frac{dT_{PL}^2}{dT_1{}^2})}}{C_2{}^2}(G_{11}) \quad dX_1 + G_{11}\, dT_1$$

$$dT_2 = G_{11}\,(dT_1 - \frac{v\sqrt{1-\frac{C_1{}^2}{v^2}\left(\frac{dT_{PL}^2}{dT_1{}^2}\right)}}{C_2{}^2} dX_1) \text{ -------------------------------- } (23)$$

Compare the coefficient of $dT_1{}^2$

$$-C_1{}^2 = G_{11}{}^2(-v\sqrt{1-\frac{\boldsymbol{C_1}{}^2}{v^2}(\frac{dT_{PL}^2}{dT_1{}^2})})^2 - C_2{}^2(G_{11})^2$$

$$-C_1{}^2 = G_{11}{}^2\left[v^2\left(1-\frac{\boldsymbol{C_1}{}^2}{v^2}\left(\frac{dT_{PL}^2}{dT_1{}^2}\right)-C_2{}^2\right)\right]$$

$$1 = G_{11}{}^2[\frac{\boldsymbol{-v^2}}{\boldsymbol{C_1}{}^2}\left(1-\frac{\boldsymbol{C_1}{}^2}{v^2}\left(\frac{dT_{PL}^2}{dT_1{}^2}\right)+\frac{\boldsymbol{C_2}{}^2}{\boldsymbol{C_1}{}^2}\right)]$$

$$G_{11} = \frac{1}{\sqrt{\frac{C_2{}^2}{C_1{}^2}-\frac{v^2}{C_1{}^2}(1-\frac{\boldsymbol{C_1}{}^2}{v^2}(\frac{dT_{PL}^2}{dT_1{}^2})}} \text{ -------------------------------- } (24)$$

Compare the coefficient of $dM_1{}^2$

$$-\frac{\boldsymbol{G_1}{}^{\mathbf{2}}}{\boldsymbol{C_{M1}}{}^{\mathbf{4}}} = -\frac{\boldsymbol{G_2}{}^{\mathbf{2}}}{\boldsymbol{C_{M2}}{}^{\mathbf{4}}} G_{11}{}^{\mathbf{2}}$$

Compare the coefficient of $dM_1 dX_1$

$$\mathbf{0} = \mathbf{-2}\frac{\boldsymbol{G_2}{}^{\mathbf{2}}}{\boldsymbol{C_{M2}}{}^{\mathbf{4}}} G_{51}\, G_{11}$$

$\boldsymbol{C_{M2}} \neq 0$, $\boldsymbol{G_2} \neq \mathbf{0}$, $G_{11} \neq 0$

SO $\quad G_{51} = 0$

$$dM_2 = G_{51}\, dX_1 + G_{11}\, dM_1 \text{ -------------------------------- } (25)$$

$$dM_2 = G_{11}\, dM_1 \text{ -------------------------------- } (20)$$

From Equation (16)

$$G_{11}{}^2 = 1 + C_2{}^2(G_{41})^2 + \frac{\boldsymbol{G_2}{}^{\mathbf{2}}}{\boldsymbol{C_{M2}}{}^{\mathbf{4}}}(G_{51})^2 \text{ -------------------------------- } (16)$$

$$G_{51} = 0 \text{ -------------------------------- } (16)$$

So $G_{11}{}^{2} = 1 + C_2{}^{2}(G_{41})^2$

$$G_{41} = \frac{-v\sqrt{1-\frac{\boldsymbol{C_1}^2}{v^2}(\frac{dT_{PL}^2}{dT_1{}^2})}}{C_2{}^2}(G_{11}) \quad \text{-------------------------------- (17)}$$

$$G_{11}{}^{2} = 1 + C_2{}^{2}(\frac{-v\sqrt{1-\frac{C_1{}^2}{v^2}(\frac{dT_{PL}^2}{dT_1{}^2})}}{C_2{}^2}(G_{11}))^{2}$$

$$G_{11}{}^{2} = 1 + G_{11}{}^{2}\ \frac{v^2}{C_2{}^2}(1-\frac{C_1{}^2}{v^2}\left(\frac{dT_{PL}^2}{dT_1{}^2}\right))$$

$$G_{11}{}^{2}(1-\frac{v^2}{C_2{}^2}(1-\frac{C_1{}^2}{v^2}\left(\frac{dT_{PL}^2}{dT_1{}^2}\right)) = 1$$

$$G_{11} = \frac{1}{\sqrt{1-\frac{v^2}{C_2{}^2}(1-\frac{C_1{}^2}{v^2}\left(\frac{dT_{PL}^2}{dT_1{}^2}\right)}} \text{----------------------- (21)}$$

From (18), (20)

$$G_{11} = \frac{1}{\sqrt{\frac{C_2{}^2}{C_1{}^2}-\frac{v^2}{C_1{}^2}(1-\frac{\boldsymbol{C_1}^2}{v^2}(\frac{dT_{PL}^2}{dT_1{}^2})}} \quad \text{-------------------------------- (19)}$$

$$G_{11} = \frac{1}{1-\sqrt{1-\frac{v^2}{C_2{}^2}(1-\frac{C_1{}^2}{v^2}\left(\frac{dT_{PL}^2}{dT_1{}^2}\right)}} \text{----------------------- (21)}$$

$$\frac{1}{\sqrt{\frac{C_2{}^2}{C_1{}^2}-\frac{v^2}{C_1{}^2}(1-\frac{\boldsymbol{C_1}^2}{v^2}(\frac{dT_{PL}^2}{dT_1{}^2})}} = \frac{1}{\sqrt{1-\frac{v^2}{C_2{}^2}(1-\frac{C_1{}^2}{v^2}\left(\frac{dT_{PL}^2}{dT_1{}^2}\right)}}$$

$$\frac{C_2{}^2}{C_1{}^2}-\frac{v^2}{C_1{}^2}(1-\frac{\boldsymbol{C_1}^2}{v^2}\left(\frac{dT_{PL}^2}{dT_1{}^2}\right) = 1-\frac{v^2}{C_2{}^2}(1-\frac{C_1{}^2}{v^2}\left(\frac{dT_{PL}^2}{dT_1{}^2}\right)$$

$$\frac{C_2{}^2}{C_1{}^2}-\frac{v^2}{C_1{}^2}-\left(\frac{dT_{PL}^2}{dT_1{}^2}\right) = 1-\frac{v^2}{C_2{}^2}-\frac{C_1{}^2}{C_2{}^2}\left(\frac{dT_{PL}^2}{dT_1{}^2}\right)$$

Compare the coefficient of $\left(\frac{dT_{PL}^2}{dT_1{}^2}\right)$

$$\frac{C_1{}^2}{C_2{}^2} = 1$$

Then $C_1{}^2 = C_2{}^2$

$So\ \ C_1 = \pm C_2$

$Let\ C_1{}^2 = C_2{}^2 = C^2$-------------------------------- (22)

$And\ \ \ G_{11} = \gamma$

$$G_{11} = \frac{1}{\sqrt{\frac{C_2{}^2}{C_1{}^2} - \frac{v^2}{C_1{}^2}(1 - \frac{\boldsymbol{C_1}{}^2}{v^2}(\frac{dT_{PL}^2}{dT_1{}^2})}}$$ -------------------------------- (19)

$$\gamma = \frac{1}{\sqrt{1 - \frac{v^2}{C^2}(1 - \frac{\boldsymbol{C}^2}{v^2}(\frac{dT_{PL}^2}{dT_1{}^2})}}$$

$$\gamma = \frac{1}{\sqrt{1 - \frac{v^2}{C^2}(1 - (\frac{dX_{PL}^2}{dX_1{}^2})}}$$ -------------------------------- (23)

$$dX_2 = G_{11}\,[dX_1 - v dT_1 \sqrt{1 - \frac{\boldsymbol{C_1}{}^2}{v^2}\left(\frac{dT_{PL}^2}{\boldsymbol{dT_1}{}^2}\right)}]$$ -------------------------------- (12)

$$dT_2 = G_{11}\,(dT_1 - \frac{v\sqrt{1 - \frac{\boldsymbol{C_1}{}^2}{v^2}\left(\frac{dT_{PL}^2}{\boldsymbol{dT_1}{}^2}\right)}}{C_2{}^2} dX_1)$$ -------------------------------- (18)

$dM_2 = G_{11}\, dM_1$-------------------------------- (20)

$C_1{}^2 = C_2{}^2 = C^2$-------------------------------- (22)

$$\gamma = \frac{1}{\sqrt{1 - \frac{v^2}{C^2}(1 - (\frac{dX_{PL}^2}{dX_1{}^2})}}$$ -------------------------------- (23)

$$dX_2 = \gamma[dX_1 - v dT_1 \sqrt{1 - \frac{dX_{PL}^2}{dX_1{}^2}}]$$ -------------------------------- (24)

$$dT_2 = \gamma(dT_1 - \frac{v\sqrt{1 - \frac{dX_{PL}^2}{dX_1{}^2}}}{C_2{}^2}\ X_1)$$ -------------------------------- (25)

$dM_2 = \gamma dM_1$-------------------------------- (26)

Compare the coefficient of $dI_1 dX_1$

$$0 = -2\frac{\boldsymbol{K_{e2}} \hbar_{\boldsymbol{2}}\, \boldsymbol{G_2}{}^{\boldsymbol{2}}}{\boldsymbol{C_{I2}}{}^{\boldsymbol{9}}} dI_2{}^2 G_{61}\, G_{11}$$

$\boldsymbol{C_{q2}} \neq 0\ \ , \boldsymbol{G_2} \neq \boldsymbol{0}\ , K_{e2} \neq \boldsymbol{0}, G_{11}\ \neq 0\ , \hbar_{\boldsymbol{2}} \neq 0$

$SO \qquad G_{61} = 0$

From Equation (19)

$dI_2 = G_{61}\, dX_1 + G_{11}\, dI_1$-------------------------------- *(19)*

$dI_2 = 0 + G_{11}\, dI_1$

$dI_2 = G_{11}\, dI_1$-------------------------------- *(27)*

Conclusion

Lorentz Transformations

$dX_2 = \gamma[dX_1 - v dT_1 \sqrt{1 - \frac{dX_{PL}^2}{dX_1{}^2}}]$ -------------------------------- *(24)*

$dT_2 = \gamma(dT_1 - \frac{v\sqrt{1 - \frac{dX_{PL}^2}{dX_1{}^2}}}{C_2{}^2}\, dX_1)$ -------------------------------- *(25)*

$dM_2 = \gamma dM_1$-------------------------------- *(26)*

$dI_2 = \gamma dI_1$-------------------------------- *(30)*

$\gamma = \frac{1}{\sqrt{1 - \frac{v^2}{C^2}(1 - (\frac{dX_{PL}^2}{dX_1{}^2})}}$ -------------------------------- *(23)*

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