Galilee-lorentz sygroup in relativistic electrodynamics

Idea

To prove that relaxation processes of the frequency and the velocity change in relativistic electrodynamics are coordinated with the parametrical system of the non isomorphic groups, which is named Galilee-Lorentz sygroup. To investigate the properties of the Galilee-Lorentz sygroup, containing these groups.

Physical aspects of the new approach

In Einstein kinematical model of the relativistic electrodynamics effects the behavior of the field is *kinematical coordinated* with the change of its frequency. The system of kinematical conditions is transitive under the influence of the Lorentz group.

In my dynamic model of the relativistic effects in electrodynamics the behavior of the field velocity *is dynamical coordinated* with the change of its frequency. Changes occur in the form of the relaxation process depending of the rate of refraction n and of the rate of relation w.

In this variant the phenomenon parameters vary from some initial values which symmetry at $w=0$ corresponds to the group Galilee, to some final values which correspond at $w=1$ to the Lorentz group.

Galilee-Lorentz sygroup gives dynamic dependence of the velocity v' from the velocity v if magnitudes n, w are changing:

$$v' = \frac{v-u}{1-\frac{uv}{c^2}wn^2}$$

Mathematical aspects of the approach

In a considered case the model of dynamic process symmetry connects the pair of the non isomorphic symmetries. In electrodynamics without the velocity limit this connection is provided by means of the rate of the refraction n and the rate of the relation w

We can take the generalised transformations of coordinate differentials:

$$dx' = \gamma(dx - udt), dt' = \gamma\left(dt - \frac{uw}{c^2}n^2dx\right), \gamma = \left(1 - \frac{u^2}{c^2}n^2w\right)^{-1/2}$$

They include the relative velocity u for the pair of the observers, the rate of the refraction n and the rate of the relation

$$w = 1 - \exp(-P_\lambda(n-1))$$

Here $u = (1-w)u_{fs} + wu_m, u_{fs}$ is the velocity of the primary radiation source, u_m is the velocity of the physical environment or the physical medium.

This object is not the group. It is the system of groups and it is named the Galilee-Lorentz sygroup because the sygroup contains at w=0 the Galilee group and at w=1 contains the Lorentz group.

The analyze shows that the formula for the representation of the sygroup has the form

$$T_{ab} = \alpha T_a T_b + \beta$$

Here α, β are the matrices.

Galilee-Lorentz sygroup in the multiplicative form

We can write Galilee-Lorentz sygroup in the form of the product of the three groups:

$$S_g = \frac{1}{\sqrt{1-w\frac{v^2}{c^2}}}\begin{pmatrix} 1 & v \\ w\frac{v}{c^2} & 1 \end{pmatrix} = \frac{1}{\sqrt{1-\frac{v^2}{c^2}w_1}}\begin{pmatrix} 1 & v \\ \frac{v}{c^2}w_1 & 1 \end{pmatrix} \cdot \frac{\sqrt{1-\frac{v^2}{c^2}w_1}}{\sqrt{1-w\frac{v^2}{c^2}}}\begin{pmatrix} \dfrac{1-\frac{v^2}{c^2}w}{1-\frac{v^2}{c^2}w_1} & 0 \\ \dfrac{(w-w_1)\frac{v}{c^2}}{1-\frac{v^2}{c^2}w_1} & 1 \end{pmatrix}$$

$$= g_1 \cdot g_{2,3}$$

$$g_{2,3} = \frac{\sqrt{1-\frac{v^2}{c^2}w_1}}{\sqrt{1-w\frac{v^2}{c^2}}}\begin{pmatrix} \dfrac{1-\frac{v^2}{c^2}w}{1-\frac{v^2}{c^2}w_1} & 0 \\ \dfrac{(w-w_1)\frac{v}{c^2}}{1-\frac{v^2}{c^2}w_1} & 1 \end{pmatrix} = \begin{pmatrix} 1 & 0 \\ \dfrac{(w-w_1)\frac{v}{c^2}}{1-\frac{v^2}{c^2}w} & 1 \end{pmatrix} \cdot \frac{\sqrt{1-\frac{v^2}{c^2}w_1}}{\sqrt{1-w\frac{v^2}{c^2}}}\begin{pmatrix} \dfrac{1-\frac{v^2}{c^2}w}{1-\frac{v^2}{c^2}w_1} & 0 \\ 0 & 1 \end{pmatrix}$$

$$= g_2 \cdot g_3$$

The sygroup it is expressed multiplicity in the form of product of three not isomorphic groups:

$$S_g = g_1 \cdot g_2 \cdot g_3$$

Galilee-Lorentz sygroup in the additive form

We can write Galilee-Lorentz sygroup in the form of the sum of three groups, having assumed as a basis group the Lorentz group. We will receive

$$\gamma_1\begin{pmatrix}1 & v\\ \frac{v}{c^2}w & 1\end{pmatrix}=\gamma\begin{pmatrix}1 & v+\sigma\alpha\\ \frac{v+\sigma\alpha}{c^2} & 1\end{pmatrix}\frac{\gamma_1}{\gamma}+\gamma_1\begin{pmatrix}1 & 0\\ \frac{v}{c^2}-(w-1)-\frac{\sigma\alpha}{c^2} & 1\end{pmatrix}-\gamma_1\begin{pmatrix}1 & \sigma\alpha\\ 0 & 1\end{pmatrix}=$$

$$=\overline{g_1}+\overline{g_2}+\overline{g_3}$$

Here

$$\gamma_1=\left(1-\frac{v^2}{c^2}w\right)^{-1/2},\gamma=\left(1-\frac{v^2}{c^2}\right)^{-1/2}$$

Additive decomposition Galilee-Lorentz sygroup on the Galilee group looks so:

$$\gamma_1\begin{pmatrix}1 & v\\ \frac{v}{c^2}w & 1\end{pmatrix}=\begin{pmatrix}1 & v+\sigma\alpha\\ 0 & 1\end{pmatrix}\gamma_1+\gamma_1\begin{pmatrix}1 & 0\\ \frac{v}{c^2}w & 1\end{pmatrix}-\gamma_1\begin{pmatrix}1 & \sigma\alpha\\ 0 & 1\end{pmatrix}=\overline{g_1}+\overline{g_2}+\overline{g_3}$$

We have the new formula:

$$g_1g_2g_3\Leftrightarrow SG\Leftrightarrow\overline{g_1}+\overline{g_2}+\overline{g_3}$$