Introduction

A little more than a hundred years ago Albert Einstein changed the view of humanity on the surrounding space having put forward the special principle of relativity [1]. The principle sets up inertial reference frames to be equivalent for the description of events. A. Einstein also showed that there is a complete mutual compliance between the equations of classical electrodynamics and the transformations of coordinates and fields of special relativity.

Consequently, the scope of classical electrodynamics and special relativity is the same — they work for the inertial coordinate system and inertial motion of the charge with an absolute precision. The greater the difference between the motion of a real body and the inertial motion, the greater should be the difference between the real coordinate transformations and the transformations of special relativity. This is shown for the transformations of real relativity [2] between real reference frames, that is, reference frames that are associated with real bodies, whose movements are far from being inertial. The transformations of real relativity are introduced by the author based on the principle of real relativity [2] that establishes the equivalence of real reference frames for the description of physical events.

Due to the complete conformity of special relativity and classical electrodynamics, one can argue that the extent of disrupting

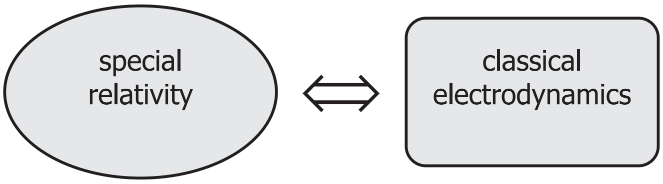

Figure 1: The "twin brothers" — special relativity and classical electrodynamics

the inertial motion of the charge in the real world corresponds to the extent of disrupting the accurate application of the equations of classical electrodynamics. Therefore, a new generalized electrodynamics should be established for a real noninertial motion of the charge. Following an analogy between the "twin brothers", the special relativity and classical electrodynamics (Fig. 1), the new electrodynamics should be based on real relativity principle and consistent with coordinate transformations between real reference frames. A new electrodynamics, along with real relativity, should employ the space of events of the oriented points and a new basic object, a $4D$ oriented point. Therefore, the new electrodynamics is the electrodynamics of oriented point (Fig. 2).

Here is the list of basic concepts and notations used in this paper.

The space of events of $4D$ oriented points [3] is used in theory having the property of absolute parallelism. It consists of a database, presenting the world space of spatial and temporal coordinates of oriented points, each of which is associated with a manifold of local coordinates corresponding to orientation angles of an oriented point (fiber). The base coordinates correspond to the index of lowercase letters of the mid alphabet i, j, k, l, m, n, while the coordinates of the fiber correspond to the indices of the lowercase letters of the beginning of the alphabet a, b, c, d, f.

This space of events has a fundamental torsion associated with non-holonomic properties of fiber coordinates. Torsion appears as the asymmetry in the Ricci rotation coefficients in the lower indices

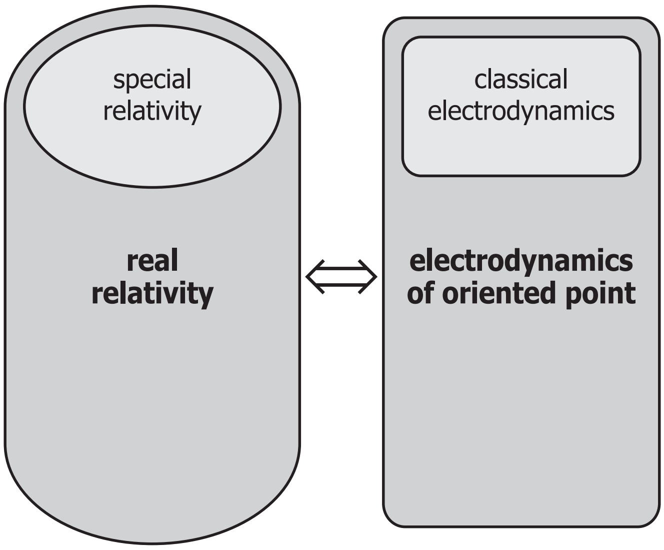

Figure 2: To new relativity — new electrodynamics

$T^a{}_{bc} \neq T^a{}_{cb}$, which are included in the expression for the connection of absolute parallelism $\Delta^i{}_{jk} = \Gamma^i{}_{jk} + T^i{}_{jk}$ [3].

The most important concept is the notion of L-vector [2]. Contravariant L-vector is a $4D$ variable Z^i, which transforms under active transformation from real reference frame $K'(O')$ into real reference frame $K''(O'')$ in the same way as the differentials of contravariant coordinates of the event

$$Z^{i''} = \Lambda^{i''}_{i'} Z^{i'}, \qquad (I.1)$$

where the transformation matrix

$$\Lambda^{i''}_{i'} = e^{i''}{}_{a''}(O'')\, \Lambda^{a''}_{a'}\, e^{a'}{}_{i'}(O') \qquad (I.2)$$

depends on the value of the contravariant tetrad field at the origin of K'', on the value of the covariant tetrad field at the origin of K', and on the current $4D$ orientation $\Lambda^{a''}_{a'}$ of real reference frame K'' with respect to real reference frame K'.

While deriving the L-covariant dynamic equations, the notion of absolute local derivative or L-covariant derivative is of major importance, being indicated as $\forall_c$ [2]:

$$\begin{aligned} \forall_c Z^a &= Z^a_{\ ,c} - T^a_{\ bc} Z^b, \\ \forall_c Z_a &= Z_{a,\, c} + T^b_{\ ac} Z_b. \end{aligned} \tag{I.3}$$

Electrodynamics of oriented point proposed in this paper seems to be a natural extension of the theory of real relativity [2], which has by now been developed in the following four parts:

Part 1 — kinematics of oriented point,
Part 2 — dynamic relationships,
Part 3 — dynamics of oriented point. Inertia,
Part 4 — electrodynamics of oriented point.