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Generalized Electrodynamics With Ternary Internal Structure

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Abstract. In Refs. [2]-[7] we suggested generalized dynamic equations of motion of relativistic charged particle inside electromagnetic fields. The dynamic equations had been formulated in terms of external, as well as, internal momenta. Evolution equations for external momenta, the Lorentz-force equations, had been derived from evolution equations for internal momenta. In this paper, along with relativistic dynamics we generalize electromagnetic fields within the scope of ternary algebra. The full theory is constructed in $4D$ euclidean space. This space possesses an advantage to build ternary mapping from three vectors onto one. The dynamics is given by non-linear evolution equations with cubic characteristic polynomial. In polar representation the internal momenta obey the Jacobi equations whereas external momenta obey the Weierstrass equations for elliptic functions. The generalized electromagnetic fields are defined by the triple fields where the first one has properties of the electric field and the other two have properties of the magnetic field. The field equations for the triple fields analogous of the Maxwell equations are suggested.

Keywords. electrodynamics, relativistic Lorentz-force equations, cubic polynomial, elliptic functions, Maxwell equations.

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