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Reviewer: Hitzer, Eckhard, M.S.

Reviewer number: 036883

Address:
Dep. of Phys. Engineering
University of Fukui
3-9-1 Bunkyo
910-8507 Fukui
Japan
hitzer@mech.fukui-u.ac.jp

Author: Almeida, Jose B.

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Review text:

This paper is suitable for graduate students and researchers with basic knowledge of gauge field theory, special and general relativity.

It begins with a brief introduction to the Clifford geometric algebra $G_{4,1}$ of five dimensional space-time $\mathbb{R}^{4,1}$. (Mathematical details appear in the appendix.) General curvature is introduced via a refractive index tensor.

The monogenic condition (zero of the 5D Dirac derivative) has a plane wave solution. The additional component of the 5D wave vector is interpreted as mass. The electromagnetic field is introduced as a gauge field. Almeida shows how to include it in the fifth reciprocal frame vector.

The monogenic condition for a 5D space time function with harmonic dependence in the 5th coordinate on the mass is shown to include the conventional Dirac equation using a matrix representation of $G_{4,1}$. The monogenic equation becomes equivalent to a $(\pm E)$ eigenvalue equation.

Sets (not unique) of four orthogonal idempotents can be introduced in $G_{4,1}$, and written as linear combinations of diagonal $SU(4)$ generators, using algebra isomorphisms. The idempotents select e.g. right and left spin solutions, isospin, strangeness and charm.

The extra dimension further allows to introduce stable product wave packet functions with 3D space dependent (spherical harmonics) and time-extra (5th) dimension dependent factors, propagating along the extra dimension.