International Conference on

Mathematical Modeling and Computational Physics



MMCP 2015

Book of Abstracts

July 13 – 17, 2015

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Joint Institute for Nuclear Research, Dubna

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Spinor-Like Hamiltonian for Maxwellian Optics[1]

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Background. Spinors are more special objects than tensor. Therefore possess more properties than the more generic objects such as tensors. Group of Lorentz two-spinors is the covering group of the Lorentz group.

Purpose. Since the Lorentz group is a symmetry group of Maxwell's equations, it is assumed to reasonable to use when writing the Maxwell equations Lorentz two-spinors and not tensors.

Method. We write the Maxwell equations using Lorentz two-spinors [1, 2]. Also used a convenient representation of Lorentz two-spinors in terms of the Riemann-Silberstein's complex vectors [3].

Results. In the spinor formalism (in the representation of the Lorentz spinors and Riemann-Silberstein's vectors) we have constructed the Hamiltonian of Maxwellian optics. With the use of spinors Maxwell's equations take the form similar to the Dirac equation.

Conclusions. For Maxwell's equations in the Dirac-like form we can expand research methods at the expense of the methods of quantum field theory. In this form, clearly visible the connection between the Hamiltonians of geometric, beam and Maxwellian optics.

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