Abstracts of reports

On the equations of electromagnetism in spaces with Finsler geometry

Voicu-Brinzei Nicoleta
"Transilvania" University, Brasov, Romania
nico.brinzei@rdslink.ro, grasza_01@yahoo.com

In two previous joint articles with S. Siparov, we have introduced a new approach to electromagnetism in Finsler spaces, based on variational calculus and exterior derivatives. In the present paper, we provide more details, especially regarding generalized currents and deduce the form of the energy-momentum tensor of the electromagnetic field. Also, solutions of Maxwell equations are given in several cases.

Finsler-Kaluza-Klein geometry, preferred frames and the Lorentzian metric

Vargas Jose G.
Phase Space Time Associates, Colombia, USA
josegvargas@earthlink.net

The Finslerian refibration of the bundle of frames of special relativity (SR) lowers the components of the 4-velocity from the fibers to the base manifold and has a Kaluza-Klein (KK) space associated with it where proper time constitutes the fifth dimension. The dot product of its unit dual vector, **u**, with the elements $\mathbf{e}_\mu$ (μ=1,i; i=1,2,3) of the tangent bases to the spacetime subspace are the components of the 4-velocity in the standard formulation. Hence **u** is not perpendicular to that subspace.

Whereas the time direction is not orthogonal to 3-space in preferred frame alternatives to SR, the proper time direction of the KK space is. The set **(u**, $\mathbf{e}_i$) now behaves like the set ($\mathbf{e}_\mu$) does in SR. The significance of this result lies in that a (quantum system) clock is what it is because of dynamics ruled directly by its proper time, rather than by the proper time of some other system, as laboratory time is. The Lorentz metric thus also becomes associated with preferred frame physics, though differently.

In KK space, the motion of a particle is no longer represented by a boost, i.e. by a hyperbolic rotation of a frame. In the preferred frame scenario, standard rotations do, however, involve a frame attached to the particle, because of the orthogonality just referred to. The emergence of the U(1)×SU(2) symmetry becomes obvious, if the transformations of the valuedness spinors is concerned when these spinors are conceived as members of ideals in the Clifford algebra of differential forms.

Symmetries, hypercomplex numbers and non-differential geometry

Kisil Vladimir V.
School of Mathematics, University of Leeds, Leeds, England, UK
kisilv@maths.leeds.ac.uk

Group actions on homogeneous spaces generates hypercomplex numbers even in the simplest case of the SL(2,R) group. A systematical study of group-invariant geometrical objects produces non-local properties, which cannot be described by differential geometry. We demonstrate this by consideration 2D models of space-time of classical and relativistic mechanics.

On finsler geometries with symmetric distance functions

Glazunov Nikolai M.
National aviation university, Kiev, Ukraine
glanm@yahoo.com

Let *F(x, y)* be the distance function (finsler function, finsler norn) on tangent bundle of smooth differentiable manifold. We investigate two geometric problems:

I. Family of geometries that is generated by the family of distance functions
$F(x, y)= F(y) = (|y^1|^p + |y^2|^p + |y^3|^p + |y^4|^p)^{1/p}$, real $p \geq 1$, and
II. Geometry that is generated by the distance function

$F(x, y) = F(y) = (|y^1 y^2 y^3 y^4|)^{1/4}$.

Family of distance function of the problem (I) is a generalization of the family of distance functions from Minkowski's conjectures on critical lattices of the domain $|x|^p + |y|^p < 1,\ p > 1$. The conjecture have investigated and proved (with colleagues) by the author of the communication. In particularly the author have investigated arithmetic and geometric properties of the family of metric functions $(|y^1|^p + |y^2|^p)^{1/p}$, real $p \geq 1$. We plan to present results in the direction.

Applications to finsler extensions of relativity theory will be done.

Tracking Concepts in the Wake of Generalizing

Fjelstad Paul
St. Olaf College, Emeritas, Northfield, USA
fjelstap@stolaf.edu

In the process of moving from complex numbers to double numbers, to quadratic numbers in general, to n-dimensional hyperbolic numbers, some concepts carry over easily from one stage to the next, while others require a trick of some sort. Specific geometric examples will be the Pythagorean Theorem and the Sum of Angles in a Triangle. The idea that each number system and its geometry have a physics interpretation will be considered, paying special attention to the Quadra number system.

Identification of red shift anisotropy on the basis of the exact decision of Mattig equation

Levin Sergey F.
Moscow Institute for expertise and tests, Moscow, Russia
info@rostest.ru, antoninaEL@rostest.ru

Spatially-angular anisotropy of red shift in emission spectrum of radio galaxies and quasars has been analyzed on the basis of the exact decision of Mattig equation. Estimations of local Hubble constant in the sectors of celestial sphere connected with factors, causing heterogeneity of the given astrophysical measurements were received. Possibility of construction of the general nonlinear red shift model for extragalactic objects with various morphological signs by means of calibration for the Hubble diagram on the distance module was shown.

Noncommutative quantum kinematics

Gromov Nikolai A.
Department of Mathematics, Komi Science Center UrD RAS, Russia
gromov@dm.komisc.ru

Space-time is a fundamental conception which underlines the most significant physical theories. Therefore analysis of a possible space-time models (or kinematics) has the fundamental meaning for physics. From the viewpoint of geometry these kinematics are realized as constant curvature spaces, which can be obtained from the spherical space by contractions and analytical continuations known as Cayley-Klein scheme (N.A. Gromov, 1990), where each parameter takes three values: real unit, imaginary unit and nilpotent unit. Nilpotent units $\imath_k^2 = 0$ have commutative law of multiplication $\imath_k \imath_m = \imath_m \imath_k \neq 0$ for $k \neq m$. New possibility for construction of the noncommutative space-time models is provided by quantum groups and quantum vector spaces (L.D. Faddeev, N.Yu. Reshetikhin, L.A. Takhtajan, 1989). Different combinations of quantum structure and Cayley-Klein scheme are described with the help of permutations σ. The transformation of the deformation parameter $z = jv$ under contraction is added in the quantum case as compared with the commutative one. As a result we have describe a wide variety of noncommutative four-dimensional space-time models.

About the theory of a physical vector field for geometry of events Berwald-Moor

Zaripov Rinat G.
Institute of Mechanics and Engineering, Kazan Science Center, Russian Academy of Sciences (IME KazSC RAS)
zaripov@mail.knc.ru

The model of a physical vector field with density of scalar and vector sources for geometry of events Бервальда-Moopa is considered. The relativistic equations of the third order for intensity of a field and the fourth order for potentials are received. The density of energy and its stream which depend on the second derivatives for intensity of a field are determined. Expression for the force working on a source of a field is resulted.

The question of waves of "deformations" in vacuum is discussed.

Why the three dimensional sphere in the quaternionic parametric description geometrization space-time?

Mel'nikov Gennadii S.
Federal State Unitary Enterprise NPC "GOI im. SI Vavilov", St.-Petersburg, Russia
GMelnikov@list.ru

The report provides conclusions and equations are shown the program of building three dimensional sphere in quaternionic parametric functions and the subsequent dissemination of the resulting model to construct various three-dimensional polar polyhedra.

When building a program of the geometrization of the space-time author used three quaternionic functions derived from the algebra of complex numbers:

quaternion algebra formed from the non-commutative algebra of complex numbers doubling:

$$Q = C1+C2j$$

C1 and C2 - complex functions.

Quaternion functions are derived from consideration of dividing the unit interval and the circle of length one point in the left and right relations.

Commutative algebras associated with equations of mathematical physics

Plaksa Sergiy
Institute of Mathematics of the National Academy of Sciences of Ukraine, Kiev, Ukraine
plaksa@imath.kiev.ua

Analytic function methods in the complex plane for plane potential fields inspire searching analogous effective methods for solving spatial problems of mathematical physics. Such methods may be based on mappings of hypercomplex algebras. Ideas of an algebraic-analytic approach to equations of mathematical physics means a finding of commutative Banach algebras such that monogenic functions defined on them form an algebra and have components satisfying to beforehand given equations with partial derivatives.

A monogenic function theory in commutative Banach algebras associated with classic equations of mathematical physics is developed at the Institute of Mathematics of the National Academy of Sciences of Ukraine. Such algebras are constructed for the two-dimensional biharmonic equation and the three-dimensional Laplace equation and some other equations.Studying monogenic functions defined in mentioned algebras discovers a way to develop effective analytic methods for solving various problems of mathematical physics.

Noneuler polyhedrons of N. Kuzenny and androhedrons

Turbin Anatoli
Institute of mathematics of National Academy of sciences of Ukraine, Kiev, Ukraine
Zhdanova Yuliya
State university of informatively-communication technologies, Kiev
turbin@imath.kiev.ua, yuzhdanova@yandex.ru

The cortege of integers $\left(\Gamma_n^0,\Gamma_n^1,...,\Gamma_n^{n-1}\right)$, where Γ_n^k it is a number k-measured sides named by character of Euler-Poincare of convex polyhedron $P_n(m)$ (m–number of vertexes) in E^n, $n \geq 4$ /

The unquestionable truth for geometricians is an Euler-Poincare formula $\sum_{k=0}^{n-1}(-1)^k \Gamma_n^k = 1-(-1)^n$, which generalizing the Euler formula.

Theorem of Euler (see, e.g. [1], where three proofs are given). *For every convex polyhedron* $V-E+S=2$.

There are convex polyhedrons for which $V-E+S\neq 2$.

Antiprisms are semiregular (Euler) polyhedrons with character of Euler $(2\cdot m, 4\cdot m, 2\cdot m+2), m\geq 3$.

The regular polyhedrons for which $V-E+S=0$ we named the polyhedrons of N. Kuzenny.

Theorem 1. *The polyhedrons of N. Kuzenny with character of Euler* $(2\cdot m, 4\cdot m, 2\cdot m)$, $m \geq 7$, *are regular. Its group of symmetry is isomorphic to the dihedral group* $C_2 \lambda C_m$ *of order* $2\cdot m$..

Hyperpyramids, in base base of which noneuler polyhedrons of N. Kuzenny are lies, we named the hyperpyramids of N. Kuzennogo. The characters of Euler-Poincare of hyperpyramids of N. Kuzenny are equal $(m+1, 3\cdot m, 2\cdot m, m+1)$ and $(m+1)-3\cdot m+2\cdot m-(m+1)=-m$.

Theorem. *The hyperpyramids of N. Kuzenny* $(m+1,3\cdot m,2\cdot m,m+1)$, $m\geq 9$,*is form the infinite series of noneuler polyhedrons in* E^4*:* $(m+1)-3\cdot m+2\cdot m-(m+1)=-m$.

Literature:

[1] Ashkenuze V.G. Polygons and polyhedrons // Encyclopedia of elementary mathematics. V 4. Geometry – M.: Fizmatgiz, 1963. –568 p. – p. 382-467.

Euclidean to Finslearian geometry

Pandey Triyugi N.

Department of Mathematics & Statistics, D. D. U. Gorakhpur University, Gorakhpur, INDIA

vkcoct@gmail.com

In the popular lecture I shall touch following points:

- Brief sketch of geometry before Euclid.
- Logical development of the thought which led to be postulates of Euclidean geometry, controversy on Euclid's fifth postulate, emergence of Riemannian geometry.
- Gemotrisation of calculus of variation which led to the foundation of Finsler geometry.
- Model's of Finsler spaces.

Four-dimensional Finsler spaces in terms of scalars

Pandey Triyugi N.

Department of Mathematics & Statistics, D. D. U. Gorakhpur University, Gorakhpur, INDIA

vkcoct@gmail.com

In the year 1941, L. Berwald defines the scalar component of tensor quantity in two-dimensional Finsler space, taking two $(l_i, m_i = C_i/C)$ unit vectors mutually perpendicular to each other as basis. In the year 1971, Moor define in three-dimensional scalar component of tensor in the light of Berwald definition, taking two unit vector of Berwald frame (l_i,m_i) and the third unit vector $n_i = e_{ijk}\, l^j\, m^k$ perpendicular to the plane of the two as a basis. In the year 1996, we define fourth unit vector $p_i = e_{ijkl}\, l^j\, m^k\, n^l$ perpendicular to the Moor frame (l_i, m_i, n_i). Taking (l_i, m_i, n_i, p_i) four mutually perpendicular vectors as a frame we have define scalars components of a geometrical quantity in a four-dimensional Finsler space.

Equation of geodesic for a (α,β) metric in a two-dimensional Finsler space

Chaubey Vinit Kumar

Department of Mathematics & Statistics, D. D. U. Gorakhpur University, Gorakhpur, INDIA

vkcoct@rediffmail.com, vkcoct@gmail.com

In 1997, Matsumoto and Park obtained the equation of geodesic in two-dimensional Finsler spaces with the Randers metric ($L= \alpha+\beta$) and the Kropina metric ($L= \alpha^2/\beta$), whereas in 1998, they have obtained the equation of geodesic in two-dimensional Finsler space with the slope metrics, i.e. Matsumoto metric given by ($L= \alpha^2/(\alpha-\beta)$), by considering β as an infinitesimal of degree one and neglecting infinitesimals of degree more than two they obtained the geodesics of two-dimensional Finsler space in the form $y''= f(x,y,y')$, where (x, y) are co-ordinate of two-dimensional Finsler space. In this paper we have shown that under the same conditions as for the Matsumoto metric, the geodesic of the two-dimensional space with following metrics are the same as that of Matsumoto metric

$L= c_1\, \alpha+c_2\, \beta+ \beta^2/\alpha$

$L= (c_1\, \alpha^2+c_2\, \alpha\, \beta+ c_3\beta^2)/(\alpha+\beta)$

We have also deal the geodesic of two-dimensional Finsler space with metric,

$L= c_1\, \alpha+c_2\, \beta+ \beta^2/\alpha$

All the above three metrics are special form of the general metric,

$L= (k_1\, \alpha^2+k_2\, \alpha\, \beta+ k_3\beta^2)/(a_1\alpha+ a_2\beta)$

where, a's and k's are constants.

Invariant theory of Killing tensors and its applications

Smirnov Roman

Department of Mathematics and Statistics, Dalhousie University, Halifax, Nova Scotia, Canada

rgsmirnov@gmail.com

Our research is devoted to the study of invariants and covariants of Killing tensors defined in spaces of constant curvature and their applications to the problems of Mathematical Physics. We wish to investigate and discuss a possibility to generalize our results to more general spaces of Finsler geometry.

On n-ary subgroups of n-ary group $< A^{n-1}, [\ ]_{n,\,n-1}$

Galmak Alexander M., Vorob'ev G.N., Balan Vladimir D.
Mogilev State University of Food Technology, Mogilev, Belarus
University Politehnica of Bucharest, Faculty of Applied Sciences, Department of Mathematics I, Bucharest, Romania.
Shche70@mail.ru

The structure of n-ary group $< A^{n-1}, [\ ]_{n,\,n-1} >$ is studied. In particular it is proved that the n-ary group $< A^{n-1}, [\ ]_{n,\,n-1} >$ has semiinvariant but noninvariant subgroups

Monogenic functions in a three-dimensional harmonic algebra

Shpakivskyi Vitalii
Institute of Mathematics of the National Academy of Sciences of Ukraine, Kiev, Ukraine
shpakivskyi@mail.ru

We obtained a constructive description of all monogenic (continuous differentiable in the sense of Gateaux) functions taking values in a commutative harmonic algebra $\mathbb{A}_3$ of the third rank over the field of complex numbers by means analytic functions of the complex variable.

For monogenic functions taking values in the algebra $\mathbb{A}_3$ we proved analogs of classical theorems of the theory of analytic functions of the complex variable: the Cauchy integral theorems for surface integral and curvilinear integral, the Morera theorem, the Cauchy integral formula, the Taylor theorem and the Laurent theorem. We proved an equivalence of different definitions of monogenic function and classified singular points of monogenic functions.

Problem of detection of space-time anisotropy

Gladyshev Vladimir O.
Research Institute Hypercomplex Systems in Geometry and Physics, Fryazino, Moscow region, Russia
Bauman Moscow State Technical University, Moscow, Russia
vgladyshev@mail.ru

In the work it is studied the anisotropy arising in moving optical transparent media with 3-dimensional velocity fields. In these media, the velocity of light propagation nonlinearly depends on the vector field of the motion of the medium. As a result, optical anisotropy can depend on the orientation of the orientation of the velocity field of the moving medium relative to the velocity of motion of the interferometer in the space of independent physical variables. All numerical calculations are based on the coordinate solution of the dispersion equation (Bolotovsky B.M., Stolyarov S.N. UFN, 1989).

The main results of the experiments confirmed the classical linear dependence of the shift of the interference fringe on the velocity of motion of the medium, for a velocity range of 36 m/s.

A reliable repeated time signal, pointing out the presence of variations in the position of the interference picture with spatial variations of the interferometer orientation was not obtained. At present time works are conducted in increasing of the experimental exactness with two orders. This is possible by means of using greater optical disk rotation frequency, by increasing the number of passings through the medium, by a better vibro-protection system of the interferometer, optimization of interferometer parameters and signal filtering.

On the Finslerian extension of the Schwarzschild metric

Silagadze Zurab
Budker Institute of Nuclear Physics, Novosibirsk, Russia
silagadze@inp.nsk.su

We provide a Finslerian extension of the Schwarzschild metric based on heuristic arguments. The proposed metric asymptotically approaches not the Minkowski space-time but the Bogoslovsky locally anisotropic space-time which arises naturally as a deformation of very special relativity.

Hyperbolic analog for electromagnetic field

Pavlov Dmitri G.
Research Institute of Hypercomplex Systems in Geometry and Physics, Fryazino, Moscow region, Russia
geom2004@mail.ru

Proceeding from the analogy for pairs of fundamental mathematical objects: holomorphic functions of a complex variable – potential-solenoidal vector fields on Euclidian plane and h-holomorphic functions with double variable – hyperbolical potential-solenoidal vector fields on pseudo-Euclidian plane, we suggest a hypothesis that except an electromagnetic field in the real space-time there is a hyperbolic analog of the field which conforms conditions for h-holomorphy of functions with double variable in the case of reducing real 4-D situations to 2-D those without sources. We suppose to verify the hypothesis experimentally and would like to present a scheme of the corresponding laboratory set.

Algebraic unified theory of space-time and matter on the double variable

Pavlov Dmitri G.
Research Institute of Hypercomplex Systems in Geometry and Physics, Fryazino, Moscow region, Russia
Kokarev Sergei S.
Research Institute of Hypercomplex Systems in Geometry and Physics, Fryazino, Moscow region, Russia
geom2004@mail.ru, logos-center@mail.ru

(Algebraic version of relativity theory, having intermediate character between GR and SR, is developed on the base of double numbers algebra. In a space-time vacuum basic object of the theory – hyperbolic potential F is h-holomorphic function of double variable. It describes splitting of conformally deformed flat space-time on the time-like and space-like directions. It is shown that effect of conformal deformation is in principle observable with using experiments, involving comparison of time intervals, measured by clocks, moving along different world lines. The regions of space-time, occupied by matter are described by the condition $F_{,h^*} \neq 0$. The dynamics of hyperbolic potential is described by action of special kind, whose potential term is the function of only hyperbolic module of non-holomorphicity. It is shown, that field equations are h-conjugated non-linear wave equations with self-action. Specific properties of these equations are: a) unconditional presence of the first integral; b) compatibility (integrability) condition, defining class of admissible fields with generalized holomorphicity condition. The latter one is crucial point providing consistent and reliable unified physical model of space-time and matter in 2D. An example of general static universe is considered. Relation between the approach and standard relativity theory is discussed.)

Staircase (generalized exponential) form of polynumbers considered taking H_3 and H_4 as an example

Lebedev Sergei V.
Research Institute Hypercomplex Systems in Geometry and Physics, Fryazino, Moscow region, Russia
Bauman Moscow State Technical University, Moscow, Russia
Garas'ko Grigory I.
Research Institute Hypercomplex Systems in Geometry and Physics, Fryazino, Moscow region, Russia
Russian Institute for Electrotechnics, Moscow, Russia
Pavlov Dmitri G.
Research Institute of Hypercomplex Systems in Geometry and Physics, Fryazino, Moscow region, Russia
Panchelyuga Victor A.
Research Institute Hypercomplex Systems in Geometry and Physics, Fryazino, Moscow region, Russia
Institute of theoretical and experimental biophysics, Puschino, Moscow region, Russia
serleb@rambler.ru, gri9z@mail.ru, geom2004@mail.ru, panvic333@list.ru

It is proposed staircase form of polynumbers analogous to their exponential form. The properties of given form of triple- and quadronumbers are analyzed. Importance of staircase (generalized exponential) form of polynumbers is considered.

About Julia pre-fractals structure on the double-numbers plane

Pavlov Dmitri G.
Research Institute of Hypercomplex Systems in Geometry and Physics, Fryazino, Moscow region, Russia
Panchelyuga Mariya S.
Research Institute Hypercomplex Systems in Geometry and Physics, Fryazino, Moscow region, Russia
Institute of theoretical and experimental biophysics, Puschino, Moscow region, Russia

Panchelyuga Victor A.
Research Institute Hypercomplex Systems in Geometry and Physics, Fryazino, Moscow region, Russia
Institute of theoretical and experimental biophysics, Puschino, Moscow region, Russia
panvic333@list.ru

Double-numbers analogous of Julia sets pre-fractals in the case of quadratic mapping are constructed. Numerical algorithm, which allows correct visualization of the Julia set pre-fractals is described and limits of it applicability are illustrated. Methods, which allow studying of the Julia sets shapes are described and application of the methods to pre-fractals of low orders is demonstrated.

Anisotropic Riemannian and Finsler metrics revisited

Fil'chenkov Mikhail
Institute of Gravitation and Cosmology. Peoples' Friendship University of Russia, Moscow, Russia
Laptev Yuri
Bauman Moscow State Technical University, Moscow, Russia
fmichael@mail.ru, yplaptev@rambler.ru

The description of anisotropy using Finsler metrics supplements but does not replace that using Riemannian metrics. Finsler and Riemannian metrics with real coefficients cannot describe common anisotropic spaces.

On the singular Finsler metrics with the arbitrary class of singularity

Zhotikov Vadim G.
Moscow Institute for Physics and Technology (National Research University), Dolgoprudny, Moscow region, Russia
zhotikov@yandex.ru

The transition from the classical theory to quantum theory [1] assumes transition from the lagrangian to the Hamiltonian and, further, from Hamiltonian to the quantum theory. In practice it is necessary frequently to face with the situations when expressions for the generalized momentum's appear unsolvable to a set of the generalized speeds. For systems with final number the degrees of freedom such situation arises if a rank of Hessian from Lagrange function (lagrangian) on to the generalized speeds is less then the number of the degrees of the freedom of system under investigation. Such lagrangians refereed to the the singular or the particular. At transition to systems with infinite number of the degrees of the freedom (the condensed environments, field systems, etc.) this problem not only remains but is even more aggravated. The indicated problem receives the graceful solution by the application with the methods of the of Finsler geometry [2].

In the represented report we describe the general geometrical method to the decision the problems of the relativistic dynamics for the systems with the singular lagrangians.

References

[1] P.A.M. Dirac: *Lectures on quantum mechanics.* New York, 1964.

[2] G.I. Zhotikov: *Singular Finsler metrics define in* $\boldsymbol{X^n}$ *with the help of field of the local singular hyperplanes with class of singularity* $n - m - 1$// Scientific papers of Bashkirian University. Russia, Ufa (1965). Vol. 20, series: mathematical sciences № 2. P. 32 – 45 (in russian).

The analysis of anisotropy of distribution of parametres of polarisation of radiation of quasars along celestial sphere.

Vargashkin Vladimir Ya.
Department of physics, Oryol State Technical University, Oryol, Russia
varg@ostu.ru

375 results of observations of coefficient and a angle of polarization of radiation of quasars are known. Also there is a procedure of processing of results of supervision of a angle of the polarization, developed by D.Hutsemekers, R. Cabanac, H. Lamy and D. Sluse. The procedure allows to calculate these effects the full phase of polarization with the account of the continuous gyration of its vector. In the present work similar calculations for known quasars are executed. Allocation of these parameters on celestial sphere for detection of unknown anisotropy of the Universe is analyzed. Correlation of anisotropy of these parameters with parameters of anisotropy of a cosmic microwave background radiation is explored.

Finslerian lenses

Perminov Nikolai S.
Department of General Relativity and Gravitation, Faculty of Physics, Kazan (Volga) State University, Russia
nikolai-kazan@rambler.ru

In this paper, finslerian spaces F4 admitting an isometry group SO(3) are found. For these spaces, we obtain solutions of gravitational field equations in vaccuum with generalized curvature tensor and solve, in the first order in the small parameter, the problem of scattering.

On the bounded volume of algebraic hypersurfaces

Shakirov Shamil R.
Institute For Theoretical and Experimental Physics, Moscow, Russia
shakirov@itep.ru

Volume, bounded by an algebraic hypersurface in Euclidean space, is an important geometric characteristic of the hypersurface and has a lot of applications, in particular to geometry with Finslerian metric function. In this paper we show, that the bounded volume is equal to the integral discriminant of the surface. This gives a convenient practical way to calculate the bounded volume, as well as gives a direct connection with invariant theory of SL(n,C).

Links of linear and Finsler geometries of space-time induced by the structure of complex quaternions

Kassandrov Vladimir V.
Institute of gravitation and cosmology of Peoples' Friendship University of Russia, Moscow, Russia
vkassan@sci.pfu.edu.ru

Symmetry group SO(3,C) of the biquaternion algebra gives rise to a complex invariant with square of modulus reproducing the Minkowski interval, and Finslerian with respect to the primary complex coordinates. On the other hand, structure of the complex cone of null elements induces "dynamical" 6D geometry with topology S^3 x S^2 x R. In the framework of unified ``algebrodynamical" approach we develop, mathematical links and physical consequences of these geometrical structures are considered

Jet local Riemann-Finsler geometry for the three-dimensional time

Neagu Mircea, Atanasiu Gh.
University Transilvania of Brasov, Faculty of Mathematics and Informatics
mircea.neagu@unitbv.ro

The aim of this paper is to develop on the 1-jet space $J^1(R,M^3)$ the Finsler-like geometry (in the sense of distinguished (d-) connection, d-torsions and d-curvatures) for the rheonomic Berwald-Moyr metric of order three (i.e. the t-dependent conformal deformation of the jet Berwald-Moyr metric of order three). Some natural jet geometrical field theories (gravitational and electromagnetic) produced by the preceding rheonomic Berwald-Moyr metric are also exposed.

Microstructure of physical vacuum and opportunity of the scalar bosons generation

Gorelik Vladimir S.
Lebedev Physical Institute of Russian Academy of Sciences, Moscow, Russia
gorelik@sci.lebedev.ru

Analysis of the physical vacuum properties as anisotropic lattice structure with lattice constant a~10^{-33} см is presented. The connection of quasicrystalline vacuum model with the Finsler spaces properties is discussed. Experimental schemes for the generation of low energy scalar bosons in vacuum on the base stimulated Raman scattering processes in molecular media under power laser excitation are proposed.

Variations of FPC as a Test of Space-Time Anisotropy and New SI

Melnikov Vitaly N.
Centre for Gravitation and Fundamental Metrology, VNIIMS and Institute of Gravitation and Cosmology, Peoples Friendship University of Russia, Moscow, Russia
Bronnikov Kirill A. ,
Centre for Gravitation and Fundamental Metrology, VNIIMS and Institute of Gravitation and Cosmology, Peoples Friendship University of Russia, Moscow, Russia
melnikov@phys.msu.ru, kb20@yandex.ru

We discuss the problems related to variations of fundamental constants, in particular, the data on observed variations of the fine structure constant in quasar spectra, and the planned transition to new definitions of the SI units, based on fixed values of the fundamental physical constants. It is pointed out that all necessary conditions for such a transition are not yet fulfilled, and probably it will not be realized before 2015.

Finsler geometry effects in surface phenomena physics: the case of monolayer systems

Krylova Galina V., Krylova Nina G.
Belarussian State University, Minsk, Belarus
grushevskaja@bsu.by, nina-kr@tut.by

A study of structurization when formating of molecular LB-monolayers is of great interest as nanocomposites based on LB-structures used for nanoelectronics. The phenomenon of electrocapillarity on interphase boundary consisting in change of monolayer surface tension because of redistribution of electric charge on interphase boundary is the important factor in structure-formation process in LB-monolayer by its compressing. Nevertheless, at present the qualitative phenomenological description is known only. In our work we examine an influence of redistribution of a charge density of a double layer on structurization of LB-monolayer. The goal of the work is to geometrize interactions in the LB-monolayer in such a way that solutions of equations for a motion of particle in the monolayer are approximated by geodesics of Finsler two-dimensional space and to investigate two-dimensional finsler metric effects in surface phenomena physics for the monolayer case. The calculations of proposed model to geometrize interactions at LB-monolayer formation were carried out in a resonance approximation, and a simulation have shown that there exist several regimes of the structure formation which depend on compression speed and characteristics of double electrical layer.

To question about duality between algebras of double numbers and complex numbers

Lapshin Alexander V.
Ural State University named A. M. Gorkiy, Russia
lavexander@mail.ru

Algebras of double and complex numbers are dual each other. There is limit transition between algebras. With the help of real number sequence there introduces conception of dual limit both of complex and double number. Possible physical consequences are discussed.