



International
Scientific Conference

Algebraic and Geometric Methods of Analysis

26-30 may 2020
Odesa, Ukraine

LIST OF TOPICS

- Algebraic methods in geometry
- Differential geometry in the large
- Geometry and topology of differentiable manifolds
- General and algebraic topology
- Dynamical systems and their applications
- Geometric problems in mathematical analysis
- Geometric and topological methods in natural sciences

ORGANIZERS

- Ministry of Education and Science of Ukraine
- Odessa National Academy of Food Technologies
- Institute of Mathematics of the National Academy of Sciences of Ukraine
- Odessa I. I. Mechnikov National University
- Taras Shevchenko National University of Kyiv
- International Geometry Center
- Kyiv Mathematical Society

PROGRAM COMMITTEE

Chairman: Prishlyak A. (<i>Kyiv, Ukraine</i>)	Kiosak V. (<i>Odesa, Ukraine</i>)	Pokas S. (<i>Odesa, Ukraine</i>)
Balan V. (<i>Bucharest, Romania</i>)	Kirillov V. (<i>Odesa, Ukraine</i>)	Polulyakh E. (<i>Kyiv, Ukraine</i>)
Banakh T. (<i>Lviv, Ukraine</i>)	Konovenko N. (<i>Odesa, Ukraine</i>)	Sabitov I. (<i>Moscow, Russia</i>)
Bolotov D. (<i>Kharkiv, Ukraine</i>)	Lyubashenko V. (<i>Kyiv, Ukraine</i>)	Savchenko A. (<i>Kherson, Ukraine</i>)
Borysenko O. (<i>Kharkiv, Ukraine</i>)	Maksymenko S. (<i>Kyiv, Ukraine</i>)	Sergeeva A. (<i>Odesa, Ukraine</i>)
Cherevko Ye. (<i>Odesa, Ukraine</i>)	Matsumoto K. (<i>Yamagata, Japan</i>)	Shelekhov A. (<i>Tver, Russia</i>)
Fedchenko Yu. (<i>Odesa, Ukraine</i>)	Mormul P. (<i>Warsaw, Poland</i>)	Volkov V. (<i>Odesa, Ukraine</i>)
Karlova O. (<i>Chernivtsi, Ukraine</i>)	Mykhailyuik V. (<i>Chernivtsi, Ukraine</i>)	Zarichnyi M. (<i>Lviv, Ukraine</i>)
	Plachta L. (<i>Krakov, Poland</i>)	

ADMINISTRATIVE COMMITTEE

- Egorov B., chairman, rector of the ONAFT;
- Povarova N., deputy chairman, Pro-rector for scientific work of the ONAFT;
- Mardar M., Pro-rector for scientific-pedagogical work and international communications of the ONAFT;
- Fedosov S., Director of the International Cooperation Center of the ONAFT;
- Kotlik S., Director of the P.M. Platonov Educational-scientific institute of computer systems and technologies "Industry 4.0";
- Svytyy I., Dean of the Faculty of Computer Systems and Automation.

ORGANIZING COMMITTEE

Kirillov V.
Konovenko N.
Fedchenko Yu.

Maksymenko S.
Cherevko Ye.

Osadchuk E.
Prus A.

ІНТЕРНАЦІОНАЛЬНИЙ ЦЕНТР СПІВРОБІТНИЦТВА

Representation of gravi-electromagnetism using matrix algebra

İsmail Aymaz

(Kütahya Dumlupınar University, Graduate School of Sciences, Department of Physics, Kütahya, Turkey)

E-mail: aymazismail7@gmail.com

Mustafa Emre Kansu

(Kütahya Dumlupınar University, Faculty of Art and Science, Department of Physics, Kütahya, Turkey)

E-mail: memre.kansu@dpu.edu.tr

The vector, matrix and tensor algebras are frequently used in order to formulate many physical systems and engineering problems [?]. The nature of quantum mechanics, which is one of the significant areas of physics, has increased the importance of matrix algebra due to including non-commutative structures. Therefore, matrix algebra satisfies the great contributions and developments. In this study, after defining matrix definitions of quaternion algebra [?, ?], which is one of the member of higher dimensional algebra, both electromagnetism and linear gravity [?, ?, ?] are combined by using matrix representation with dual [?] and complex [?] units. By this way, we have firstly showed the isomorphism and similarity between quaternion and matrix algebras for gravi-electromagnetism [?, ?].

REFERENCES

- [1] B. Jancewicz. *Multivectors and Clifford Algebra in Electrodynamics*. Singapore: World Scientific, 1989.
- [2] W. R. Hamilton. *Elements of Quaternions*. New York: Chelsea Publishing, 1969.
- [3] K. Gürlebeck and W. Sprössig. *Quaternionic and Clifford Calculus for Physicists and Engineers*. Chichester: Wiley, 1997.
- [4] O. Heaviside. A Gravitational and Elecromagnetic Analogy (Part I). *The Electrician*, 31: 281, 1893.
- [5] A.S. Rawat and O.P.S. Negi. Quaternion gravi-electromagnetism. *Int. J. Theor. Phys.*, 51(3): 738, 2012.
- [6] B.S. Rajput. Unification of generalized electromagnetic and gravitational fields. *J. Math. Phys.*, 25(2): 351, 1984.
- [7] S. Demir and K. Özdaş. Dual quaternionic reformulation of electromagnetism. *Acta Phys. Slov.*, 53(6): 429, 2003.
- [8] S. Demir, M. Tamışlı, N. Şahin and M.E. Kansu. Biquaternionic reformulation of multifluid plasma equations. *Chinese J. Phys.*, 55(4): 1329, 2017.
- [9] M. A. Güngör and M. Sarduvan. A note on dual quaternions and matrices of dual quaternions. *Scientia Magna*, 7(1): 1, 2011.
- [10] S. Demir. Matrix realization of dual quaternionic electromagnetism. *Cent. Eur. J. Phys.*, 5(4): 487, 2007.

Зміст

G. M. Abdishukurova, A. Ya. Narmanov <i>On the geometry of submersions</i>	3
B. N. Apanasov <i>Hyperbolic 4-cobordisms, Teichmuller spaces and quasiregular mappings in space</i>	5
Aymaz I., Kansu M. <i>Representation of gravi-electromagnetism using matrix algebra</i>	7
V. Bilet, O. Dovgoshey <i>Uniqueness of pretangent spaces at infinity</i>	9
Bolotov D. <i>Foliations of 3-manifolds with small module of mean curvature</i>	10
Bolsinov A. V. <i>On integrability of geodesic flows on 3-dimensional manifolds</i>	11
E. Bonacci <i>Algebraic and geometric questions about the EM helix</i>	12
Borisenko A. A., Sukhorebska D. D. <i>Geodesics on regular tetrahedra in spherical space</i>	13
F. Bulnes <i>Motivic hypercohomology solutions in field theory II</i>	14
I. Denega <i>Estimate of maximum of the products of inner radii of mutually non-overlapping domains</i>	16
A. Dudko, V. Pivovarchik <i>Inverse problem for tree of Stieltjes strings</i>	18
N. Glazunov <i>Formal groups and algebraic cobordism</i>	20
O. Gok <i>A note on tensor product of Archimedean vector lattices</i>	22
E. Gül. <i>Trace Regularization Problem On a Banach Space</i>	24
O. Ye. Hentosh <i>Centrally extended generalization of the superconformal loop Lie algebra and integrable heavenly type systems on supermanifolds</i>	26
B. Hladysh, A. Prishlyak <i>Structure of functions on an oriented 2-manifold with the boundary</i>	28
D. A. Juraev <i>The Cauchy problem for matrix factorizations of the Helmholtz equation in a multidimensional bounded domain</i>	30
A. Kachurovskii <i>Fejer Sums and the von Neumann Ergodic Theorem</i>	31
B. N. Khabibullin, R. R. Muryasov <i>Mixed volumes/areas and distribution of zeros of holomorphic functions</i>	33
B. Klishchuk, R. Salimov <i>On the behavior at infinity of one class of homeomorphisms</i>	35
A. Kravchenko, S. Maksymenko <i>Automorphisms of cellular divisions of 2-sphere induced by functions with isolated critical points</i>	37
A. Kushner, E. Kushner, R. Matviichuk <i>Dynamics and exact solutions of linear PDEs</i>	39