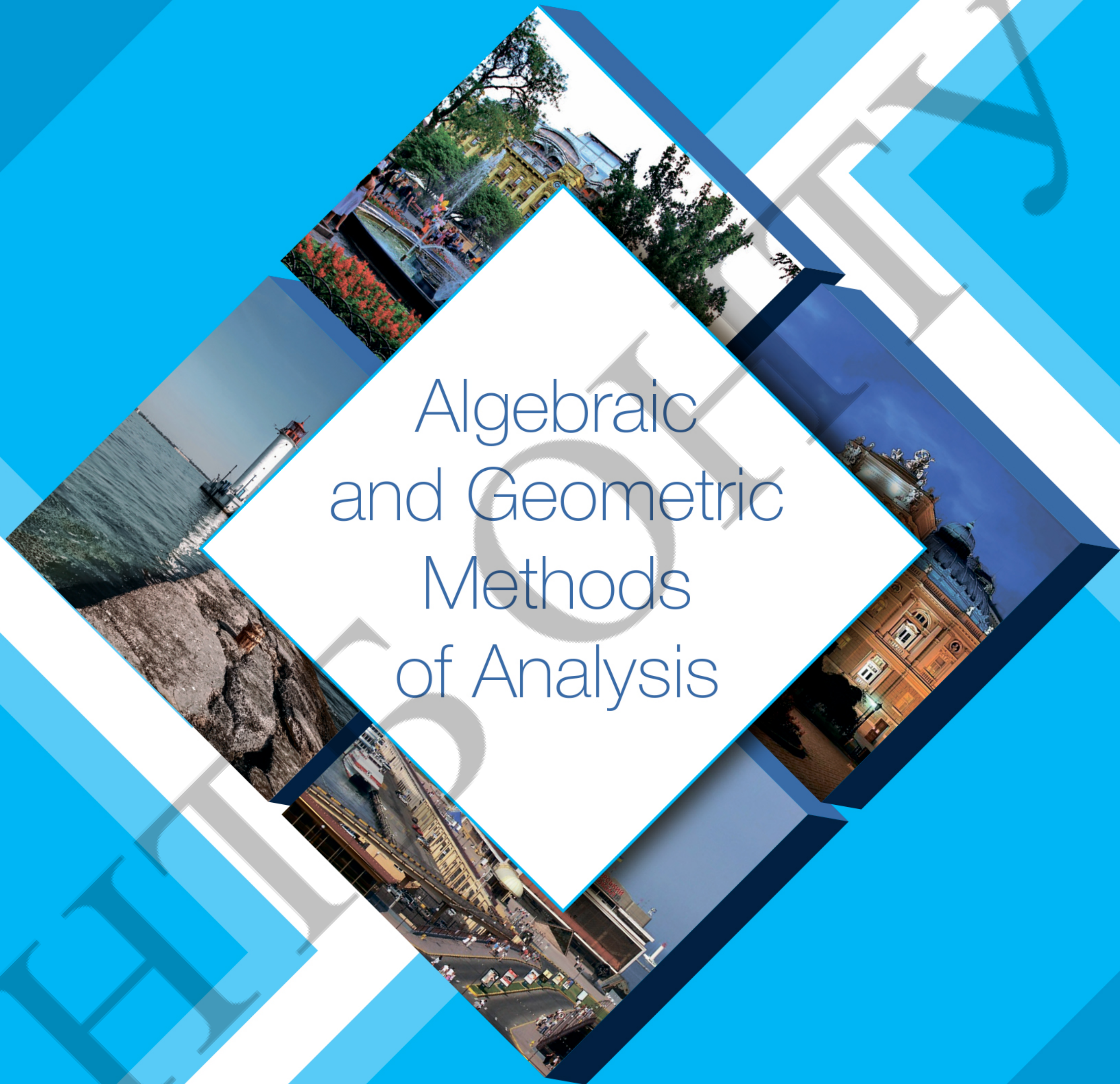
International
Scientific Conference



Algebraic and Geometric Methods of Analysis

27-30 May 2024
Odesa, Ukraine

The purpose of this conference is to bring together researchers in geometry, topology, algebra, analysis and dynamical systems and to provide for them a forum to present their recent work to colleagues from different nationalities. This way we aim to stimulate discussion about the latest findings in geometrical and topological methods in analysis and to increase international collaboration.

The conference continues the traditional annual conference «Geometry in Odesa» holding from 2004, and hosted by Odesa National University of Technology (Odesa National Academy of Food Technologies till 2021). From 2017 the conference was renamed to «Algebraic and geometric methods of analysis» (AGMA).

The Conference languages: Ukrainian and English.

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 and topological methods in natural sciences
- Geometric problems in mathematical analysis

Organizers

- Ministry of Education and Science of Ukraine
- Odesa National University of Technology, Ukraine
- Institute of Mathematics of the National Academy of Sciences of Ukraine
- Taras Shevchenko National University of Kyiv
- Kyiv Mathematical Society

Scientific Committee

- **Vladimir Balan** (*Bucharest, Romania*)
- **Taras Banakh** (*Lviv, Ukraine*)
- **Dmytro Bolotov** (*Kharkiv, Ukraine*)
- **Vyacheslav Boyko** (*Kyiv, Ukraine*)
- **Yulia Fedchenko** (*Odesa, Ukraine*)
- **Oleg Gutik** (*Lviv, Ukraine*)
- **Olena Karlova** (*Chernivtsi, Ukraine*)
- **Volodymyr Kiosak** (*Odesa, Ukraine*)
- **Nadiia Konovenko** (*Odesa, Ukraine*)
- **Volodymyr Lyubashenko** (*Kyiv, Ukraine*)
- **Sergiy Maksymenko** (*Kyiv, Ukraine*)
- **Koji Matsumoto** (*Yamagata, Japan*)
- **Piotr Mormul** (*Warsaw, Poland*)
- **Maryna Nesterenko** (*Kyiv, Ukraine*)
- **Roman Popovych** (*Kyiv, Ukraine*)
- **Alexandr Prishlyak** (*Kyiv, Ukraine*)
- **Aleksandr Savchenko** (*Kherson, Ukraine*)

Organizing commitee

- **Nadiia Konovenko** (*Odesa, Ukraine*)
- **Yuliya Fedchenko** (*Odesa, Ukraine*)
- **Mykola Lysynskiy** (*Kyiv, Ukraine*)
- **Bohdan Mazhar** (*Kyiv, Ukraine*)
- **Sergiy Maksymenko** (*Kyiv, Ukraine*)
- **Alexandr Prishlyak** (*Kyiv, Ukraine*)

References

[1] Oksana E. Hentosh. Lie-algebraic structure of the Lax-integrable $(2|1+1)$-dimensional supersymmetric matrix dynamical systems. *Ukr. Math. J.*, 69(10) : 1537–1560, 2018.

The some solution of the Bryan-Pidduck equation

Oleksii Hukalov
(B. Verkin ILTPE of NASU, Kharkiv, Ukraine)
E-mail: hukalov@ilt.kharkov.ua

Vyacheslav Gordevskyy
(V. N. Karazin Kharkiv National University, Kharkiv, Ukraine)
E-mail: gordevskyy2006@gmail.com

The nonlinear integrodifferential Boltzmann equation [1] that describes the evolution of rarefied gases is one of the main equations of the kinetic theory of gases. The Boltzmann equation for the model of rough spheres (or the Bryan–Pidduck equation) has the form

$$D(f) = Q(f, f); \tag{1}$$

$$D(f) \equiv \frac{\partial f}{\partial t} + \left(V, \frac{\partial f}{\partial x}\right), \tag{2}$$

$$\begin{gathered} Q(f,f) \equiv \frac{d^2}{2} \int_{R^3} dV_1 \int_{R^3} d\omega_1 \int_{\Sigma} d\alpha B(V - V_1, \alpha) \\ \Big[f(t, V_1^*, x, \omega_1^*) f(t, V^*, x, \omega^*) - f(t, V, x, \omega) f(t, V_1, x, \omega_1) \Big]. \end{gathered} \tag{3}$$

The problem of determination of the exact and approximate solutions of the Bryan–Pidduck equation in the explicit form is quite urgent. At present, the sole known exact solution of the Boltzmann equation is an expression usually called the Maxwell distribution or simply Maxwellian (after J. C. Maxwell, Scottish physicist). In the case of Maxwellians M, we get

$$D(f) = 0, \quad Q(f, f) = 0. \tag{4}$$

The solution to this equation (1)-(3) will be look for in the next form

$$f(t, x, V, \omega, u) = \int_{\mathbb{R}^3} \varphi(t, x, u) M(V, \omega, u) du. \tag{5}$$

As a measure of the deviation between the parts of equation (1) we will consider a uniform-integral error of the form:

$$\Delta = \sup_{(t,x)\in\mathbb{R}^4} \int_{\mathbb{R}^3} dV \int_{\mathbb{R}^3} d\omega \Big| D(f) - Q(f, f) \Big|. \tag{6}$$

In the paper [2], we were obtained sufficient conditions for the coefficient functions and hydrodynamic parameters appearing in the distribution, which enable one to make the analyzed error (6) as small as desired.

References

[1] S. Chapman and T.G. Cowling. The Mathematical Theory of Non-Uniform Gases. *Cambridge Univ. Press,* Cambridge, 1952.

[2] V.D. Gordevskyy and O.O. Hukalov. *Continual distribution for the Bryan-Pidduck Equation, Ukrainian Mathematical Journal.* Vol. 72, No. 11, 1715–1723.

Disjoint dynamical properties of wedge operators

Stefan Ivković

(Mathematical Institute of the Serbian Academy of Sciences and Arts, p.p. 367, Kneza Mihaila 36, 11000 Beograd, Serbia)

E-mail: stefan.iv10@outlook.com

Let H be a separable Hilbert space and $B_0(H)$ be the C^*-algebra of compact operators on H. Given an invertible bounded operator W and a unitary operator $\mathcal{U}$ on H, we let $T_{\mathcal{U},\mathcal{W}}$ be the operator on $B_0(H)$ given by $T_{\mathcal{U},W}(F) = WF\mathcal{U}$ for all $F \in B_0(H)$. Such operators are called wedge operators. In this talk, we characterize disjoint hypercyclic finite sequences of wedge operators. We provide also sufficient conditions for a finite sequence of the dual wedge operators to be disjoint topologically transitive. Finally, we give concrete examples and applications. The talk will be based on [1].

References

[1] Ivković, S., Tabatabaie, S.M. Disjoint Linear Dynamical Properties of Elementary Operators. Bull. Iran. Math. Soc. 49, 63 (2023). https://doi.org/10.1007/s41980-023-00808-1.

On semi-symmetric (α, β, γ)-inverse quasigroup

Richard Ilemobade

(Obafemi Awolowo University, Ile Ife, Nigeria)

E-mail: richardilemobade@gmail.com

Temitope Gbolahan Jaiyeola

(University of Lagos, Akoka, Nigeria and Obafemi Awolowo University, Ile Ife, Nigeria)

E-mail: tgjaiyeola@unilag.edu.ng, tjayeola@oauife.edu.ng

Quasigroups and loops are generalizations of groups (see [2, 9, 10]).

Definition 1. Let $(Q, \cdot)$ be a system of non-empty set Q and a binary operation $(\cdot)$. $(Q, \cdot)$ will be called a quasigroup if for $a, b \in Q$, the equations $a \cdot x = b$ and $y \cdot a = b$ have unique solutions $(x, y) \in Q \times Q$.

Definition 2. A quasigroup $(Q, \cdot)$, in which there is a unique element $\mu \in Q$, such that $x \cdot \mu = x = \mu \cdot x \ \ \forall \ x \in Q$, is called a loop. The element μ is called the identity element in Q.

In associative algebraic systems, the notion of an inverse element or property holds significance only when the system possesses a neutral element, as seen in groups, for instance. Nevertheless, in quasigroups, the inverse property can be meaningfully established even when there is no neutral element present.