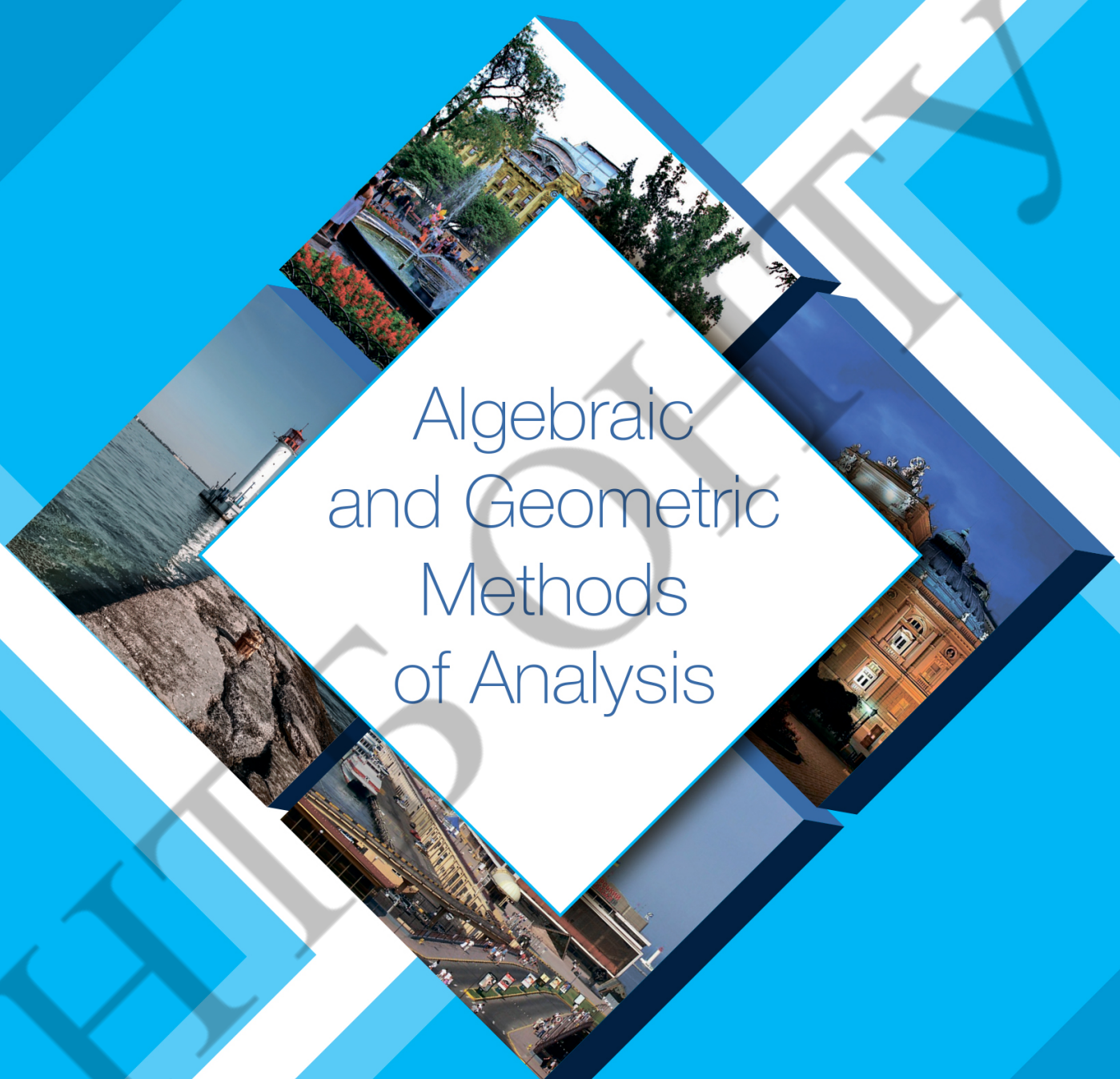


International
Scientific Conference



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

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Multiplicative b -homogeneralized Derivations of Associative Rings

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In this manuscript, we present multiplicative b -homogeneralized derivation on an associative ring R and discuss certain differential (functional) identities having multiplicative b -homogeneralized derivation. Investigating the centralizer of suitable subset over semiprime rings that admit multiplicative b -homogeneralized derivation enhances some outcomes in the literature. We refer the reader to [4] and [2] for more details.

As is well known, the problem of linear mappings preserving fixed products is a very interesting item in the field of operator algebra. Derivations that can be completely determined by the local action on some subsets of algebra have attracted attention of many researchers. The Martindale ring of quotients of a prime ring R was introduced in [6] as a tool for studying rings satisfying a polynomial identity. The concept was extended to semiprime rings in [5]. Historically, the study of derivation was initiated during the 1950s and 1960s. Derivations of rings got a tremendous development in 1957, when [3] established two very striking results in the case of prime rings.

Named that R is a semiprime when R satisfy the expression $r_1 R r_1 = 0$ which yields $r_1 = 0$ and R is prime if $r_1 R r_2 = 0$ which supply two options there either $r_1 = 0$ or $r_2 = 0$. As a factual information about the connection between the previous concepts a prime and semiprime ring mentioned as following: A prime ring forms another kind of ring, which is a semiprime, while the converse, unfortunately, is not always true.

When a ring R admits for all $r_1, r_2 \in R$ satisfying Leibniz's rule, which is $d(r_1 r_2) = d(r_1) r_2 + r_1 d(r_2)$ then a derivation is that an additive map $d: R \rightarrow R$. Whenever for all $r_1, r_2 \in R$ there exists an identity $D(r_1 r_2) = D(r_1) r_2 + r_1 d(r_2)$. Then, D is an additive mapping defined as $D: R \rightarrow R$ is recorded as a generalized, *i.e.* a generalized derivation, where d worked as an additive mapping derivation over R .

In 2000, a classical definition of homoderivation posted in El Sofy's article [1], where he was described an additive mapping a homoderivation concerning a ring R like ψ from R to R satisfying $\psi(xy) = \psi(x)\psi(y) + \psi(x)y + x\psi(y)$ where x and y belong to R . Moreover, mapping $F: R \rightarrow Q_{mr}$ associated with derivation (need not be additive) $d: R \rightarrow R$ such that $F(\sigma\tau) = F(\sigma)\tau + b\tau d(\tau)$ holds for all $\sigma, \tau \in R$ and any fixed $0 \neq b \in Q_s \subset Q_{mr}$. If F is additive (not necessarily additive), then F is called b -generalized derivation (multiplicative b -generalized).

Definition 1. Suppose that R is an associative ring, mapping $F: R \rightarrow Q_{mr}$ associated with homoderivation $d: R \rightarrow R$ such that $F(\sigma\tau) = F(\sigma)F(\tau) + F(\sigma)\tau + b\tau d(\tau)$ holds for all $\sigma, \tau \in R$

and any fixed $0 \neq b \in Q_s \subset Q_{mr}$. When F (is not necessarily additive), then F is called b -homogeneralized derivation (multiplicative b -homogeneralized).

Theorem 2. *Let R be a semiprime ring and K be a nonzero dense ideal of R . Suppose $F: R \rightarrow Q_{mr}$ is a multiplicative b -homogeneralized derivation associated with derivation $d: R \rightarrow R$ satisfying the condition $[F(\sigma), \tau] \in Z(R)$ for all $\sigma, \tau \in K$ and any $0 \neq b \in Q_s \subseteq Q_{mr}$.*

Theorem 3. *Let R be a semiprime ring and K be a nonzero dense ideal of R . Assume $F: R \rightarrow Q_{mr}$ is a multiplicative b -generalized derivation associated with derivation $d: R \rightarrow R$ such that $F([\sigma, \tau]) = 0$ for all $\sigma, \tau \in K$ and any $0 \neq b \in Q_s \subseteq Q_{mr}$. Then either d is commuting over R is commutative or $[\sigma, b] = 0$.*

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Algebra in fields extended by infinity

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Definition 1. A *corps* is a set F endowed with two binary operations $+, \cdot: F \times F \rightarrow F$ and two distinct constants $0, 1 \in F$ that satisfy the following eight axioms:

- (1) $\forall x, y, z \in F$ ($x + (y + z) = (x + y) + z$);
- (2) $\forall x \in F$ ($x + 0 = x = 0 + x$);
- (3) $\forall x \in F \exists y \in F$ ($x + y = 0 = y + x$);
- (4) $\forall x, y, z \in F$ ($x \cdot (y \cdot z) = (x \cdot y) \cdot z$);
- (5) $\forall x \in F$ ($x \cdot 1 = x = 1 \cdot x$);
- (6) $\forall x \in F \setminus \{0\} \exists y \in F$ ($x \cdot y = 1 = y \cdot x$);
- (7) $\forall a, x, y \in F$ ($a \cdot (x + y) = a \cdot x + a \cdot y$);
- (8) $\forall x, y, b \in F$ ($(x + y) \cdot b = x \cdot b + y \cdot b$).

A corps F is called a *field* if $x \cdot y = y \cdot x$ for all elements $x, y \in F$.

Definition 2. A *procorps*¹ is a set F endowed with two binary operations $+, \cdot: F \times F \rightarrow F$ and three distinct constants $0, 1, \infty \in F$ that satisfy the following nine axioms:

- (1) $\forall x, z \in F \forall y \in F \setminus \{\infty\}$ ($x + (y + z) = (x + y) + z$);
- (2) $\forall x, y \in F$ ($x + y = y + x$);
- (3) $\forall x \in F$ ($x + 0 = x = 0 + x$);
- (4) $\forall x, z \in F \forall y \in F \setminus \{0, \infty\}$ ($x \cdot (y \cdot z) = (x \cdot y) \cdot z$);
- (5) $\forall x \in F$ ($x \cdot 1 = x = 1 \cdot x$);

¹*Procorps* is an abbreviation of a “projective corps”.

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