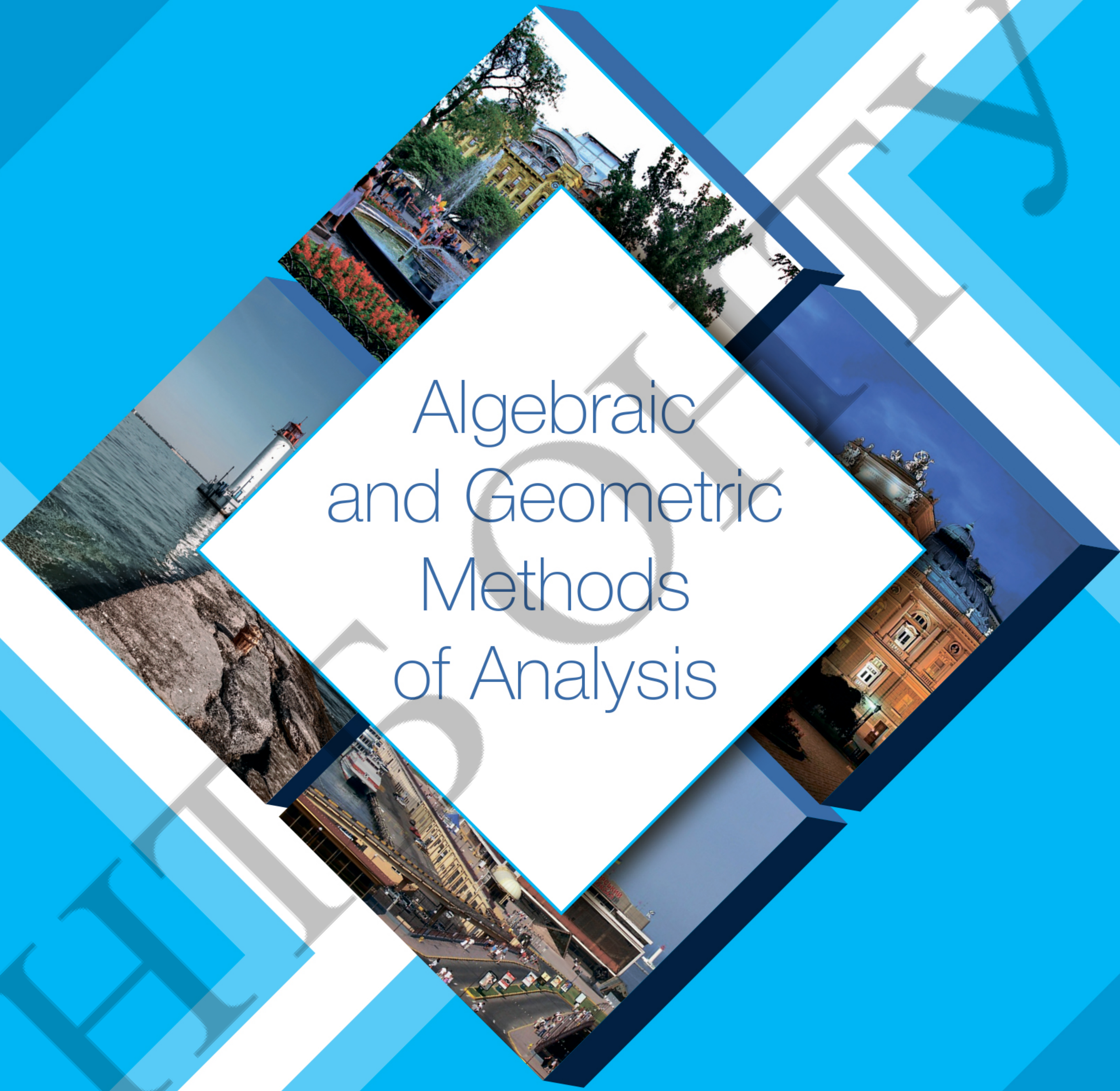
International
Scientific Conference



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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On representation type of incident algebras of extensions of positive posets

Vitaliy Bondarenko
(Institute of Mathematics of NAS of Ukraine, Kyiv, Ukraine)
E-mail: vitalij.bond@gmail.com

Maryna Styopochkina
(Polissia National University, Zhytomyr, Ukraine)
E-mail: stmar@ukr.net

In 1972, P. Gabriel introduced a quadratic form for finite quivers, which was called by him the Tits quadratic form. He proved that a quiver Q is of finite representation type over a field k (i.e., has up to equivalence finitely many indecomposable representations) if and only if its Tits quadratic form is positive. This result laid the foundations of a new direction in the theory of algebras.

In 1974, Yu. A. Drozd showed that a (finite) poset S is of finite representation type if and only if its quadratic Tits form

$$q_S(z) = z_0^2 + \sum_{i\in S} z_i^2 + \sum_{i<j,i,j\in S} z_i z_j - z_0 \sum_{i\in S} z_i$$

is weakly positive, i.e., positive on the non-zero vectors with non-negative coordinates (representations of posets were introduced by L. A. Nazarova and A. V. Roiter in 1972). In contrast to quivers, the posets with weakly positive and with positive Tits forms do not coincide. Since the connected quivers having positive Tits quadratic form coincide with the quivers whose underlying graphs are (simply faced) Dynkin diagrams, the posets with positive Tits form are analogs of the Dynkin diagrams. Such posets, which are simply called positive, were classified by the authors in [1]. Up to isomorphism and duality, the positive posets consist of 5 series and 108 discrete ones.

Since the incidence algebras of positive posets are of finite representation type, it is natural to study representation type of their element-extensions. We consider cases when "new elements" are nodes (in the sence that they are comparable with all other elements). Here we formulate some consequences of our investigation.

A positive poset T is called serial if there exists infinite consequence $T \subset T_1 \subset T_2 \subset \dots$ such that all posets T_i are also positive. By definition, the incidence algebra $\mathcal{I}_k(T)$ of a poset T of order n is the matrix algebra which consisits of all matrices $M = (m_{ij})$, $i, i \in T$ (over a field k) such that $m_{ij} = 0$ if $i > j$. Finally, we write $X > Y$ for subposets X, Y of a poset T if $x > y$ for any $x \in X, y \in Y$.

Theorem 1. *Let S be a positive poset and $\overline{S} = S \cup X$ be an extension of S with chained $X > S$. Then the incidence algebra $\mathcal{I}_k(\overline{S})$ is of infinite representation type if the length $l(X)$ of X is greater than 5.*

Theorem 2. *Let $\overline{S}$ be as in Theorem 1 but S is non-serial. Then the incidence algebra $\mathcal{I}_k(\overline{S})$ is of infinite representation type if*

(a) the width of S is equal to 2 and $l(X) > 4$;

(b) the width of S is equal to 3 and $l(X) > 1$.

In all statements the estimates are exact.

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A theorem on hypercohomology groups and singular homology in field theory

Francisco Bulnes
(IINAMEI, Research Department in Mathematics and Engineering, TESCHA)
E-mail: francisco.bulnes@tesch.edu.mx

In this research we consider a theorem that relates the hypercohomology groups obtained with the spectrum through the its singular homology taking components $\mathbb{Z}_{tr}(k)$ and the A_1 -homotopy in the action of the symmetric $\mathrm{DM}^{eff,-}_{Nis}(k)$. Then we can characterize in a projective vector bundle the solutions of the field equations $\mathrm{d}da = 0$ on singularities.

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Geometric and algebraic-topological structures in Schwartz distribution spaces for relativistic Quantum Mechanics

David Carfì
(Department of Physics, University of Messina, Italy)
E-mail: dcarfi@unime.it

The classic Hilbert space methods cannot be used for the definition and resolution of the free relativistic Schrödinger equation because the very fundamental solutions of this equation cannot be framed in a Hilbert or Banach space context. We can justify the necessity to use distribution theory, for many reasons. If we lock down ourselves in separable Hilbert space theory, we cannot

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