



International
Scientific Conference



Algebraic and Geometric Methods of Analysis



Devoted to 160 anniversary of
Dvytro Grave
(25.08.1863 - 19.12.1939)
Academician of the Ukrainian
Academy of Sciences, the
first director of the Institute of
Mathematics of NAS of Ukraine

May 29 – June 1, 2023
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 and topological methods in natural sciences
- Geometric problems in mathematical analysis

ORGANIZERS

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

SCIENTIFIC COMMITTEE

- | | |
|--------------------------------------------------|---------------------------------------------------|
| • Bolotov D. (<i>Kharkiv, Ukraine</i>) | • Konovenko N. (<i>Odesa, Ukraine</i>) |
| • Bondarenko V. (<i>Kyiv, Ukraine</i>) | • Maksymenko S. (<i>Kyiv, Ukraine</i>) |
| • Boychuk O. (<i>Kyiv, Ukraine</i>) | • Mikhailets V. (<i>Kyiv, Ukraine</i>) |
| • Boyko V. (<i>Kyiv, Ukraine</i>) | • Ostrovskiy V. (<i>Kyiv, Ukraine</i>) |
| • Cherevko Ye. (<i>Odesa, Ukraine</i>) | • Petravchuk A. (<i>Kyiv, Ukraine</i>) |
| • Dorogovtsev A. (<i>Kyiv, Ukraine</i>) | • Plaksa S. (<i>Kyiv, Ukraine</i>) |
| • Drozd Yu. (<i>Kyiv, Ukraine</i>) | • Portenko M. (<i>Kyiv, Ukraine</i>) |
| • Gerasymenko V. (<i>Kyiv, Ukraine</i>) | • Pratsiovytyi M. (<i>Kyiv, Ukraine</i>) |
| • Fedchenko Yu. (<i>Odesa, Ukraine</i>) | • Savchenko O. (<i>Kherson, Ukraine</i>) |
| • Kiosak V. (<i>Odesa, Ukraine</i>) | • Romanyuk A. (<i>Kyiv, Ukraine</i>) |
| • Kochubei A. (<i>Kyiv, Ukraine</i>) | • Timokha O. (<i>Kyiv, Ukraine</i>) |

ORGANIZING COMMITTEE

- | | |
|--------------------------------------------------|-------------------------------------------------|
| • Maksymenko S. (<i>Kyiv, Ukraine</i>) | • Cherevko Ye. (<i>Odesa, Ukraine</i>) |
| • Konovenko N. (<i>Odesa, Ukraine</i>) | • Osadchuk Ye. (<i>Odesa, Ukraine</i>) |
| • Fedchenko Yu. (<i>Odesa, Ukraine</i>) | • Sergeeva O. (<i>Odesa, Ukraine</i>) |

On the structure of the distribution of one random series.

Oleh Makarchuk

(Volodymyr Vynnychenko Central Ukrainian State University)

E-mail: makolpet@gmail.com

Let $s \in \mathbb{N}, s > 1, \sum_{n=1}^{+\infty} a_n$ — convergent series, ξ_n — a sequence of independent random variables that acquire the values $0 < a_{0n} < a_{1n} < \dots < a_{(s-1)n} < 1$ with probabilities $p_{0n}, p_{1n}, \dots, p_{(s-1)n}$ respectively. Consider a random variable

$$\xi = \sum_{n=1}^{+\infty} a_n \xi_n.$$

According to the Jessen-Wintner theorem [1], the distribution ξ is pure. Partial cases for the ξ distribution were considered in the works of [2], [3], [4].

Let

$$M = \left\{ \sum_{n=1}^{+\infty} b_n a_n \mid b_n \in \{a_{0n}; a_{1n}; \dots; a_{(s-1)n}\} \forall n \in \mathbb{N} \right\}.$$

Theorem 1. *Let the sequence $(s^n |a_n|)$ be bounded.*

If $\lambda(M) = 0$, then the distribution ξ is discrete if and only if

$$\prod_{n=1}^{+\infty} \max\{p_{0n}; p_{1n}; \dots; p_{(s-1)n}\} = 0,$$

singular if and only if

$$\prod_{n=1}^{+\infty} \max\{p_{0n}; p_{1n}; \dots; p_{(s-1)n}\} > 0.$$

If $\lambda(M) > 0$, then the distribution ξ is discrete if and only if

$$\prod_{n=1}^{+\infty} \max\{p_{0n}; p_{1n}; \dots; p_{(s-1)n}\} = 0,$$

absolutely continuous if and only if

$$\sum_{n=1}^{+\infty} \sum_{j=0}^{s-1} \left(p_{jn} - \frac{1}{s}\right)^2 < +\infty,$$

singular if and only if

$$\sum_{n=1}^{+\infty} \sum_{j=0}^{s-1} \left(p_{jn} - \frac{1}{s}\right)^2 = +\infty.$$

REFERENCES

- [1] Jessen B., Wintner A. Distribution function and Riemann Zeta-function. *Trans.Amer.Math.Soc*, 38 : 48–88, 1935.
- [2] Marsaglia G. Random variables with independent binary digits. *Ann.Math.Statist*, 42 : 1922–1929,1971.

- [3] Peres Y., Solomyak B. Absolute continuity of Bernoulli convolutions, a simple proof. *Math. Res. Lett.*, 3(2) : 231–239, 1996.
- [4] Peres Y., Schlag W., Solomyak B. Sixty years of Bernoulli convolutions. *Fractal Geometry and Stochastics II. Progress in Probability*, 46 : 39–65, 2000.

Homotopy types of diffeomorphisms groups of simplest Morse-Bott foliations on lens spaces

Sergiy Maksymenko

(Institute of Mathematics of National Academy of Sciences of Ukraine, Kyiv)

E-mail: maks@imath.kiev.ua

Let F be the Morse-Bott foliation on the solid torus $T = S^1 \times D^2$ into 2-tori parallel to the boundary and one singular circle $S^1 \times 0$. A diffeomorphism $h : T \rightarrow T$ is called *foliated* (resp. *leaf preserving*) if for each leaf $\omega \in F$ its image $h(\omega)$ is also leaf of F (resp. $h(\omega) = \omega$). Gluing two copies of T by some diffeomorphism between their boundaries, one gets a lens space $L_{p,q}$ with a Morse-Bott foliation $F_{p,q}$ obtained from F on each copy of T . Denote by $\mathcal{D}^{fol}(T, \partial T)$ and $\mathcal{D}^{lp}(T, \partial T)$ respectively the groups of foliated and leaf preserving diffeomorphisms of T fixed on the boundary ∂T . Similarly, let $\mathcal{D}^{fol}(L_{p,q})$ and $\mathcal{D}^{lp}(L_{p,q})$ be respectively the groups of foliated and leaf preserving diffeomorphisms of $F_{p,q}$. Endow all those groups with the corresponding C^∞ Whitney topologies. The aim of the talk is give a complete description the homotopy types of the above groups $\mathcal{D}^{fol}(T, \partial T)$, $\mathcal{D}^{lp}(T, \partial T)$, $\mathcal{D}^{fol}(L_{p,q})$, $\mathcal{D}^{lp}(L_{p,q})$ for all p, q .

REFERENCES

- [1] O. Khokhliuk, S. Maksymenko, *Homotopy types of diffeomorphisms groups of simplest Morse-Bott foliations on lens spaces*, 1, arXiv:2210.11043
- [2] S. Maksymenko, *Homotopy types of diffeomorphisms groups of simplest Morse-Bott foliations on lens spaces*, 2, arXiv:2301.12447

Spaces of idempotent measures with countable support

Iurii Marko

(Ivan Franko National University of Lviv, 1 Universytetska Str., 79000 Lviv, Ukraine)

E-mail: marko13ua@gmail.com

Methods of infinite-dimensional topology can be applied to the problem of description of topology of various objects in particular, hyperspaces and spaces of probability measures (see [1]-[3]). It is our aim to consider the topology of spaces of idempotent measures, which are counterparts of probability measures in the idempotent mathematics (see, e.g, [5]).

Having in mind the identification of every idempotent measure with its density function, we consider, for every metric space X , the set $\bar{I}(X)$ of the closed subsets A of $X \times [0, 1]$ satisfying the following properties:

- Definition 1.**
- (1) A is saturated, i.e. $\forall (x, t) \in A \forall t', 0 \leq t' \leq t \Rightarrow (x, t') \in A$;
 - (2) $X \times \{0\} \subset A$;
 - (3) $A \cap (X \times \{1\}) \neq \emptyset$.

| | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| E. Lytvynov <i>Lie structures of the Sheffer group over a Hilbert space</i> | 58 |
| R. El Maaouy, D. Bennis, L. Oyonarte, J. R. G. Rozas <i>The Gorenstein flat model structure relative to a semidualizing module</i> | 60 |
| O. Makarchuk <i>On the structure of the distribution of one random series.</i> | 61 |
| S. Maksymneko <i>Homotopy types of diffeomorphisms groups of simplest Morse-Bott foliations on lens spaces</i> | 62 |
| Iu. Marko <i>Spaces of idempotent measures with countable support</i> | 62 |
| S. Marouaniv <i>SKT hyperbolic and Gauduchon hyperbolic compact complex manifolds</i> | 63 |
| N. Mazurenko, M. Zarichnyi <i>Invariant $*$-measures</i> | 66 |
| M. Mhamdi <i>Hölder Continuity of Generalized Harmonic Functions in the Unit Disc</i> | 67 |
| Ł. Michalak <i>Reeb graph invariants of Morse functions, manifolds and groups</i> | 69 |
| P. Mormul <i>Car+trailers' systems are locally nilpotentizable (a Trieste 2000 conference revisited)</i> | 70 |
| J. Morris <i>Degree theory for proper C^1 Fredholm mappings with applications to boundary value problems on the half line</i> | 70 |
| S. Myroshnychenko, K. Tatarko, V. Yaskin <i>How far apart can the projection of the centroid of a convex body and the centroid of its projection be?</i> | 71 |
| M. Nesterenko <i>Contractions of representations and realizations of Lie algebras</i> | 73 |
| Yu. Nikolayevsky <i>Geodesic orbit pseudo Riemannian nilmanifolds</i> | 74 |
| Z. Novosad, A. Zagorodnyuk <i>The conditions of hypercyclicity of weighted backward shifts</i> | 75 |
| T. Obikhod <i>Studying the properties of a superpotential using algebraic equations</i> | 76 |
| P. O. Olanipekun <i>On critical submanifolds of the Willmore energy in four dimensions</i> | 78 |
| I. Ovtsynov <i>Fermat–Torricelli sets of finite sets of points in Euclidean plane</i> | 80 |
| C. A. Pallikaros <i>Degenerations of complex associative algebras of dimension three</i> | 82 |
| J. F. Peters, F. Peu, J. Zia <i>Several forms of the geometric Lusternik-Schnirel'mann category</i> | 82 |