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.** (*Kharkiv, Ukraine*)
- **Bondarenko V.** (*Kyiv, Ukraine*)
- **Boychuk O.** (*Kyiv, Ukraine*)
- **Boyko V.** (*Kyiv, Ukraine*)
- **Cherevko Ye.** (*Odesa, Ukraine*)
- **Dorogovtsev A.** (*Kyiv, Ukraine*)
- **Drozd Yu.** (*Kyiv, Ukraine*)
- **Gerasymenko V.** (*Kyiv, Ukraine*)
- **Fedchenko Yu.** (*Odesa, Ukraine*)
- **Kiosak V.** (*Odesa, Ukraine*)
- **Kochubei A.** (*Kyiv, Ukraine*)
- **Konovenko N.** (*Odesa, Ukraine*)
- **Maksymenko S.** (*Kyiv, Ukraine*)
- **Mikhailets V.** (*Kyiv, Ukraine*)
- **Ostrovskyi V.** (*Kyiv, Ukraine*)
- **Petravchuk A.** (*Kyiv, Ukraine*)
- **Plaksa S.** (*Kyiv, Ukraine*)
- **Portenko M.** (*Kyiv, Ukraine*)
- **Pratsiovytyi M.** (*Kyiv, Ukraine*)
- **Savchenko O.** (*Kherson, Ukraine*)
- **Romanyuk A.** (*Kyiv, Ukraine*)
- **Timokha O.** (*Kyiv, Ukraine*)

Organizing commitee

- **Maksymenko S.** (*Kyiv, Ukraine*)
- **Konovenko N.** (*Odesa, Ukraine*)
- **Fedchenko Yu.** (*Odesa, Ukraine*)
- **Cherevko Ye.** (*Odesa, Ukraine*)
- **Osadchuk Ye.** (*Odesa, Ukraine*)
- **Sergeeva O.** (*Odesa, Ukraine*)

On the structure of the distribution of one random series.

Oleh Makarchuk
(Volodymyr Vynnychenko Central Ukrainian State University)
E-mail: makolpet@gmail.com

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

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

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

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

singular if and only if

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

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

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

absolutely continuous if and only if

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

singular if and only if

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

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 $h : T \to T$ 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. $\forall (x, t) \in A \; \forall t', \; 0 \le t' \le t \Rightarrow (x, t') \in A$;
(2) $X \times \{0\} \subset A$;
(3) $A \cap (X \times \{1\}) \neq$.