

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

ORGANIZING COMMITTEE

- | | |
|---|--|
| • Nadiia Konovenko (<i>Odesa, Ukraine</i>) | • Bohdan Mazhar (<i>Kyiv, Ukraine</i>) |
| • Yuliya Fedchenko (<i>Odesa, Ukraine</i>) | • Sergiy Maksymenko (<i>Kyiv, Ukraine</i>) |
| • Mykola Lysynskiy (<i>Kyiv, Ukraine</i>) | • Alexandr Prishlyak (<i>Kyiv, Ukraine</i>) |

Results on boundary behavior of quasiregular and harmonic mappings

Antti Rasila

(Department of Mathematics with Computer Science, Guangdong Technion – Israel Institute of Technology, Shantou, 515063 Guangdong, P.R. of China)

E-mail: antti.rasila@iki.fi; antti.rasila@gtiit.edu.cn

We discuss connections between different conditions involving conformal capacity densities, dilatations and multiplicities of the zeros, and boundary behavior of quasiconformal and related classes of mappings. We compare Carathéodory, Koebe and Lindelöf type results for these classes of mappings to the results from classical function theory as well as those concerning quasiconformal and quasiregular mappings in plane and n -dimensional Euclidean space.

Sufficient conditions for the existence of angular (non-tangential) limit at a boundary point can be obtained, for example, in terms of multiplicities of zeroes of the function, which are required grow fast enough on a given sequence of points approaching the boundary [1, 2, 3] Another condition makes use of makes of capacity density of a non-tangential set at the boundary [4]. We also discuss sharpness of such conditions. This presentation is based on joint work with Daoud Bshouty, Jiaolong Chen, Stavros Evdoridis, Jie Huang, and Matti Vuorinen.

REFERENCES

- [1] A. RASILA: Multiplicity and boundary behavior of quasiregular maps. *Math. Z.* **250** (2005), 611–640. MR2179614
- [2] S. PONNUSAMY, A. RASILA: *On zeroes and boundary behavior of bounded harmonic functions.* *Analysis (Munich)* **30** (2) (2010), 199–207. MR2604187
- [3] D. BSHOUTY, J. CHEN, S. EVDORIDIS, A. RASILA: Koebe and Carathéodory type boundary behavior results for harmonic mappings. *Complex Var. Elliptic Equ.* **67** (4) (2022), 962–974. DOI: 10.1080/17476933.2020.1851212
- [4] J. HUANG, A. RASILA, M. VUORINEN: On angular limits of quasiregular mappings. *J. Math. Anal. Appl.* **539** (2024), <https://doi.org/10.1016/j.jmaa.2024.128464>

Einstein Solvmanifolds not based on Nilsolitons

Rossi Federico A.

(Dipartimento di Matematica e Informatica,
Università degli studi di Perugia,
via Vanvitelli 1, 06123 Perugia, Italy.)

E-mail: federicoalberto.rossi@unipg.it

In this seminar, we describe different techniques to construct pseudo-Riemannian Einstein solvmanifolds, expanding beyond the traditional framework reliant on nilsolitons.

In the first part, we review Einstein solvmanifolds and their construction based on nilsolitons. We will recall the notion of pseudo-Iwasawa and the role of nice nilpotent Lie algebras. Subsequently, we present two different constructions of Einstein solvmanifolds that do not rely on nilsolitons and are peculiar to the indefinite case. The first construction uses contact symplectic reduction (a peculiar feature of pseudo-Sasaki geometry). The second, which is quite new, is based on solving the generalized nilsoliton equation and introduces a new methodology. Both constructions yield examples that are not isometric to any Einstein solvmanifold of pseudo-Iwasawa type.

V. Oles <i>Computing the Gromov–Hausdorff distance using gradient methods</i>	91
G. Ovando <i>Magnetic trajectories on 2-step nilmanifolds</i>	92
I. Ovtsynov <i>N-foci balls in hyperbolic geometry</i>	93
V. Penhryn, O. Nykyforchyn <i>A retraction from the space of pseudometrics to the space of ultrapseudometrics</i>	94
O. Kozachok, A. Petravchuk <i>Action of derivations on polynomials and on Jacobian derivations</i>	96
E. Petrov <i>Periodic point theorem for mappings contracting total pairwise distance</i>	98
I. Pozdniakova, O. Gutik <i>On the semigroup of non-injective monoid endomorphisms of some extension of the bicyclic monoid</i>	100
A. Prishlyak <i>Structure of gradient bifurcations on compact 2-manifolds</i>	101
V. Prokip <i>About square roots of matrices over factorial domains</i>	102
A. Rasila <i>Results on boundary behavior of quasiregular and harmonic mappings</i>	104
F. A. Rossi <i>Einstein Solvmanifolds not based on Nilsolitons</i>	104
J. Saavedra <i>Ricci flow of G_2-type real flag manifolds</i>	105
A. Serdyuk, T. Stepaniuk <i>Approximation by interpolation trigonometric polynomials on the sets of infinitely differentiable functions</i>	106
M. Serdiuk <i>Fundamental solution of non-Archimedean pseudo-differential equation of p-adic argument</i>	108
M. Serivka, O. Gutik <i>On the semigroup of injective monoid endomorphisms of a some extension of the bicyclic semigroup</i>	109
R. Servadei <i>On some nonlocal critical equations</i>	111
E. Sevost'yanov, O. Dovahopiatyi, N. Ilkevych, M. Androschuk <i>On boundary estimates of mappings, acting onto domains with a locally quasiconformal boundary</i>	111
O. Shugailo <i>Some properties of affine ruled submanifolds</i>	113
H. Sinyukova <i>On some vanishing theorems of global character about geodesic mappings of complete Riemannian spaces</i>	114
R. Skuratovskii <i>Subwreath product as structure of normal subgroups of permutational wreath products</i>	114
A. Serdyuk, I. Sokolenko <i>Uniform approximation by Fourier sums in Weyl–Nagy classes $W_{\beta,1}^r$</i>	117
I. Petkov, R. Salimov, M. Stefanchuk <i>On the asymptotic behavior of solutions to nonlinear Beltrami equation</i>	118