

National Academy of Sciences of Ukraine
Institute of Mathematics

Bogolyubov Kyiv Conference

Problems of Theoretical and Mathematical Physics

dedicated to the 115th anniversary of M.M. Bogolyubov (1909–1992)

September 24–26, 2024

Kyiv, Ukraine

Program

Section 5 Mathematics

Kyiv 2024

Links for meetings

Bogolyubov Institute for Theoretical Physics

[Stream of Sections 1-4](#)

[Program of sections 1-4, Poster Session of sections 1-4](#)

Institute of Mathematics Section 5

The meeting of the 5th section 5 will be held in a mixed format:

offline (at the Institute of Mathematics) and **online**

Zoom Meeting

<https://us02web.zoom.us/j/82179648021?pwd=jDHJr9KUCVhcYpXpmg64fSXw78RuRB.1>

Meeting ID: 821 7964 8021

Passcode: 364645

Tuesday, September 24

9:00 Registration

10:00 Conference opening (online translation from BITP)

MORNING SESSION

Chairperson: Maryna Nesterenko

10:20 **Oleksii Rebenko** “Virial expansions for correlation functions in canonical ensemble” *Institute of Mathematics of NAS of Ukraine*
(30 min) [Abstract](#)

10:50 **Dmytro Shepelsky** “Periodic problem for the nonlinear Schrödinger equation by the Riemann–Hilbert approach” *B.Verkin Institute for Low Temperature Physics and Engineering of NAS of Ukraine* [Abstract](#)
(30 min)

11:20 **Volodymyr Makarov, Natalya Mayko, Vyacheslav Ryabichev** “The properties of some new polynomials in the problem with the fractional derivative” *Institute of Mathematics of NAS of Ukraine and Taras Shevchenko National University of Kyiv* [Abstract](#)
(30 min)

11:50 COFFEE BREAK

Chairperson: Oleksii Rebenko

12:30 **Roman Popovych** “Discrete symmetries of differential equations” *Silesian University of Opava and Institute of Mathematics of NAS of Ukraine* [Abstract](#)
(30 min)

13:00 **Sergey Chuiko, Oleksiy Chuiko, Kateryna Shevtsova** “Approximation of the solutions of nonlinear matrix equations using the Newton–Kantorovich method” *Donbass state pedagogical university* [Abstract](#)
(30 min)

13:20 **Serhii Koval** “Extended symmetry analysis of (1+2)-dimensional fine Kolmogorov backward equation” *Institute of Mathematics of NAS of Ukraine* [Abstract](#)
(20 min)

13:50 LUNCH

AFTERNOON SESSION

Chairperson: Vyacheslav Boyko

- 14:30** (20 min) **Sergiy Gefter, Aleksey Piven'** “Representations of solutions of some nonlinear PDEs in the form of series in powers of the δ -function” *V.N. Karazin Kharkiv National University* [Abstract](#)
-
- 14:50** (20 min) **Oleksiy Shcherbyna** “Dissipative magnetic 2D Zakharov system in bounded domain” *V.N. Karazin Kharkiv National University* [Abstract](#)
-
- 15:10** (20 min) **Oleg Kolomiichuk** “Identification of unknown parameters of a fully controlled noisy gyroscopic system” *Institute of Mathematics of NAS of Ukraine* [Abstract](#)
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- 15:30** (20 min) **Dmytro Popovych** “Generalized symmetries of Burgers equation” *Institute of Mathematics of NAS of Ukraine and Memorial University of Newfoundland* [Abstract](#)
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- 15:50** (20 min) **Iryna Yehorchenko** “Systems of Eikonal equations – construction of general solutions” *Institute of Mathematics of NAS of Ukraine* [Abstract](#)
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- 16:10** (20 min) **Kostyantyn Sirenko, Anatoliy Poyedinchuk, Nataliya Yashina, Petr Melezhik** “Spectral theory approach to the analysis of diffraction radiation generated on a metal-backed graphene layer with periodic interface” *O.Ya. Usikov Institute for Radiophysics and Electronics, NAS of Ukraine* [Abstract](#)
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Wednesday, September 25

MORNING SESSION

Chairperson: Vyacheslav Boyko

10:00 (30 min) **Alexander Timokha, Anton Miliav** “Hidden physics models in sloshing: machine learning of multimodal equations” *Institute of Mathematics of NAS of Ukraine* [Abstract](#)

10:30 (30 min) **Viktor Gerasimenko** “About the works of M. Bogolyubov at the Institute of Mathematics” *Institute of Mathematics of NAS of Ukraine* [Abstract](#), [Talk](#)

11:00 (30 min) **Volodymyr Koshmanenko, Oksana Satur** “On structure of the point spectrum in equilibrium states of the dynamical conflict systems” *Institute of Mathematics of NAS of Ukraine* [Abstract](#), [Talk](#)

11:30 (30 min) **Vitaliy Vasylyk, Volodymyr Makarov** “Exponentially convergent method for inhomogeneous differential equation with Weyl derivative and unbounded operator coefficient in Banach space” *Institute of Mathematics of NAS of Ukraine* [Abstract](#)

12:00 COFFEE BREAK

Chairperson: Maryna Nesterenko

12:30 (30 min) **Arthemy Kiselev** “New identities for differential-polynomial structures built from Jacobian determinants” *University of Groningen* [Abstract](#), [Talk](#)

13:00 (20 min) **Mollie Susan Jagoe Brown** “Kontsevich graph γ_3 -flow of Nambu-Poisson brackets: triviality established in 2D, 3D, and now, in 4D” *University of Groningen* [Abstract](#)

13:20 (30 min) **Oleksandr Burylko** “Reversible saddle-node separatrix-loop bifurcation” *Institute of Mathematics of NAS of Ukraine* [Abstract](#), [Talk](#)

13:50 LUNCH

AFTERNOON SESSION

Chairperson: Vyacheslav Boyko

- 14:30**
(20 min) **Peter Benner, Sergey Chuiko, Olga Nesselova** “Adomian decomposition method for nonlinear boundary-value problems unsolved with respect to the derivative in the critical case” *Institute of Applied Mathematics and Mechanics of NAS of Ukraine; Max Planck Institute for Dynamics of Complex Technical Systems; Donbass state pedagogical university* [Abstract](#)
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- 14:50**
(20 min) **Kostyantyn Sirenko, Maksym Maiboroda and Vadym Pazynin, Wilhelm Keusgen** “Optimization of parameters of input pulses for passive photonic-crystal-based electromagnetic energy compressors” *O.Ya. Usikov Institute for Radiophysics and Electronics, NAS of Ukraine and Technical University of Berlin* [Abstract](#)
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- 15:10**
(20 min) **Andriy Nazarenko, Anton Nazarenko** “Towards the study of quantum properties of the Borromean rings complement in the Poincaré ball” *Bogolyubov Institute for Theoretical Physics of NAS of Ukraine and KAU, Institute of mathematics of NAS of Ukraine* [Abstract](#), [Talk](#)
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- 15:30**
(20 min) **Sergii Golubev** “Asymptotic behaviour of solutions of the differential equation of the form $y^{(4)} = \alpha_0 p(t) \varphi(y)$ with rapidly varying nonlinearity in the case of $\lambda_0 = 1$ ” *Odesa I.I. Mechnikov National University* [Abstract](#)
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- 15:50**
(20 min) **Yan Rybalko** “Well-posedness of the Cauchy problem for the two-component peakon system” *B.Verkin Institute for Low Temperature Physics and Engineering of NAS of Ukraine* [Abstract](#)
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- 16:10**
(20 min) **Ihor Sokolenko, Anatolii Serdyuk** “Approximation by interpolation trigonometric polynomials in Weyl-Nagy classes $W_{\{\beta,1\}}^r$ ” *Institute of Mathematics of NAS of Ukraine* [Abstract](#)
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Thursday, September 26

MORNING SESSION

Chairperson: Vyacheslav Boyko

10:00
(30 min) **Anatoly Nikitin** “Integrable and superintegrable quantum mechanical systems with position dependent masses invariant with respect to one-parametric Lie groups” *Institute of Mathematics of NAS of Ukraine*
[Abstract](#)

10:30
(30 min) **Volodymyr Rybalko and Antonina Rybalko** “Asymptotic analysis of spectral problems for nonlocal operators” *B. Verkin Institute for Low Temperature Physics; Engineering of NAS of Ukraine, Chalmers University of Technology; Gothenburg University and Kharkiv National University of Radio Electronics* [Abstract](#)

11:00
(30 min) **Valerii Samoilenko** “Asymptotic step-like solutions of the Burgers equation with variable coefficients and singular perturbation” *Institute of Mathematics of NAS of Ukraine* [Abstract](#)

11:30
(30 min) **Yuliia Samoilenko** “Soliton- and peakon-like solutions to the modified Camassa-Holm equation with variable coefficients” *Claude Bernard University Lyon 1* [Abstract](#)

12:00 COFFEE BREAK

Chairperson: Anatoly Nikitin

12:30
(30 min) **Nikolai Iorgov** “Painlevé I equation and modular forms” *Bogolyubov Institute for Theoretical Physics of NAS of Ukraine*
[Abstract](#)

13:00
(20 min) **Yurii Zhuravlov** “The Painlevé I equation and Virasoro algebra” *Bogolyubov Institute for Theoretical Physics of NAS of Ukraine*
[Abstract](#)

13:20
(30 min) **Vyacheslav Boyko** “On Lie symmetries of linear systems of second-order ordinary differential equations” *Institute of Mathematics of NAS of Ukraine* [Abstract](#)

13:50 LUNCH

AFTERNOON SESSION

Chairperson: Vyacheslav Boyko

14:30
(30 min) **Larissa Fardigola** “On controllability problems for the heat equation controlled by the Dirichlet boundary condition” *B. Verkin Institute for Low Temperature Physics and Engineering of NAS of Ukraine*
[Abstract](#)

15:00
(20 min) **Oleksandra Vinnichenko** “Geometric properties and exact solutions of dispersionless Nizhnik equation” *Institute of Mathematics of NAS of Ukraine* [Abstract](#)

15:20
(20 min) **Igor Gapyak** “Non-perturbative solutions of BBGKY hierarchy of evolution equations for colliding particles” *Taras Shevchenko National University of Kyiv; Institute of Mathematics of NAS of Ukraine*
[Abstract](#)

15:40
(20 min) **Iryna Denega** “Extremal decomposition problem for points on an arbitrary ellipse” *Institute of Mathematics of NAS of Ukraine* [Abstract](#)

16:00
(20 min) **Iryna Raievska, Maryna Raievska** “Local nearrings and GAP” *University of Warsaw and Institute of Mathematics of NAS of Ukraine*
[Abstract](#)

16:50 **Closing of the conference**

Poster session

(Tuesday, September 24)

Sergey Chuiko, Viktor Chuiko “Adomian decomposition method in the theory of nonlinear boundary value problems with delay in the critical case” *Donbass state pedagogical university* [Abstract](#), [Poster](#)

Sergey Chuiko, Oleksiy Chuiko, Daria Dyachenko, “Autonomous boundary-value problem unsolved with respect to the derivative in the critical case” *Donbass state pedagogical university* [Abstract](#), [Poster](#)

Oksana Hentosh “Two-dimensional central extensions of some superconformal loop Lie algebra generalization and compatibly bi-Hamiltonian $(2N+1)$ -dimensional systems on functional supermanifolds” *Pidstryhach Institute for Applied Problems of Mechanics and Mathematics of NAS of Ukraine* [Abstract](#), [Poster](#)

Oleksii Hukalov, Vyacheslav Gordevskyy “The some solution of the Boltzmann equation” *B.Verkin Institute for Low Temperature Physics and Engineering of NAS of Ukraine; V. N. Karazin Kharkiv National University* [Abstract](#), [Poster](#)

Tetiana Karataieva, Volodymyr Koshmanenko “A model of a conflict society with separate support for individual clusters” *Institute of Mathematics of NAS of Ukraine* [Abstract](#), [Poster](#)

Maryna Nesterenko “Quasicrystals in data coding” *Institute of mathematics of NAS of Ukraine and National Technical University of Ukraine “Igor Sikorsky Kyiv Polytechnic Institute”* [Abstract](#), [Poster](#)

Petro Samusenko “Asymptotic solutions of boundary value problem for singularly perturbed differential algebraic equations” *National Technical University of Ukraine “Igor Sikorsky Kyiv Polytechnic Institute”* [Abstract](#), [Poster](#)

Serhii Solodky, Yevgeniya Semenova “Application of Chebyshev polynomials for optimal differentiation and summation” *Institute of Mathematics of NAS of Ukraine* [Abstract](#), [Poster](#)

Mykola Staryi “On modern applications of Lie algebras” *KAU, Institute of Mathematics of NAS of Ukraine* [Abstract](#), [Poster](#)

Alisa Tsukanova “Solving classical systems of linear equations with the help of non-classical gradient and classical algebraic methods” *National Technical University of Ukraine “Igor Sikorsky Kyiv Polytechnic Institute”* [Abstract](#), [Poster](#)

Halyna Tuluchenko “Fitting of the cumulative function for a distribution of statistic from the one-sample Anderson-Darling test” *National Technical University “Kharkiv Polytechnic Institute”* [Abstract](#)

Olena Vaneeva, Oksana Brahinets, Olena Magda, Alexander Zhelij “Equivalence method for the construction of exact solutions of generalized Korteweg-de Vries equations” *Institute of Mathematics of NAS of Ukraine, Petro Mohyla Black Sea National University, National Technical University of Ukraine “Igor Sikorsky Kyiv Polytechnic Institute* [Abstract](#), [Poster](#)

List of participants

Section 5 Mathematics

1. **Peter Benner** *Max Planck Institute for Dynamics of Complex Technical Systems*
2. **Vyacheslav Boyko** *Institute of Mathematics of NAS of Ukraine*
3. **Oleksandr Burylko** *Institute of Mathematics of NAS of Ukraine*
4. **Sergey Chuiko** *Donbass state pedagogical university*
5. **Viktor Chuiko** *Donbass state pedagogical university*
6. **Iryna Denega** *Institute of Mathematics of NAS of Ukraine*
7. **Daria Dyachenko** *Donbass state pedagogical university*
8. **Larissa Fardigola** *B. Verkin Institute for Low Temperature Physics and Engineering of NAS of Ukraine*
9. **Igor Gapyak** *Taras Shevchenko National University of Kyiv; Institute of Mathematics of NAS of Ukraine*
10. **Sergiy Geftter** *V.N. Karazin Kharkiv National University*
11. **Viktor Gerasimenko** *Institute of Mathematics of NAS of Ukraine*
12. **Sergii Golubev** *Odesa I.I. Mechnikov National University*
13. **Nikolai Iorgov** *Bogolyubov Institute for Theoretical Physics of NAS of Ukraine*
14. **Mollie Susan Jagoe Brown** *University of Groningen*
15. **Tetiana Karataieva** *Institute of Mathematics of NAS of Ukraine*
16. **Arthemy Kiselev** *University of Groningen*
17. **Oleg Kolomiichuk** *Institute of Mathematics of NAS of Ukraine*
18. **Volodymyr Koshmanenko** *Institute of Mathematics of NAS of Ukraine*
19. **Serhii Koval** *Institute of Mathematics of NAS of Ukraine*
20. **Volodymyr Makarov** *Institute of Mathematics of NAS of Ukraine*
21. **Natalya Mayko** *Taras Shevchenko National University of Kyiv*
22. **Andriy Nazarenko** *Bogolyubov Institute for Theoretical Physics of NAS of Ukraine*
23. **Anton Nazarenko** *KAU, Institute of mathematics of NAS of Ukraine*
24. **Olga Nesmelova** *Institute of Applied Mathematics and Mechanics of NAS of Ukraine*
25. **Maryna Nesterenko** *Institute of mathematics of NAS of Ukraine; National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"*
26. **Anatoly Nikitin** *Institute of Mathematics of NAS of Ukraine*
27. **Aleksey Piven** *V.N. Karazin Kharkiv National University*
28. **Dmytro Popovych** *Institute of Mathematics of NAS of Ukraine and Memorial University of Newfoundland*
29. **Roman Popovych** *Silesian University of Opava; Institute of Mathematics of NAS of Ukraine*

30. **Oksana Hentosh** *Pidstryhach Institute for Applied Problems of Mechanics and Mathematics of NAS of Ukraine*
31. **Oleksii Hukalov** *B.Verkin Institute for Low Temperature Physics and Engineering of NAS of Ukraine*
32. **Iryna Raievska** *University of Warsaw; Institute of Mathematics of NAS of Ukraine*
33. **Maryna Raievska** *University of Warsaw; Institute of Mathematics of NAS of Ukraine*
34. **Oleksii Rebenko** *Institute of Mathematics of NAS of Ukraine*
35. **Vyacheslav Ryabichev** *Taras Shevchenko National University of Kyiv*
36. **Volodymyr Rybalko** *B. Verkin Institute for Low Temperature Physics; Engineering of NAS of Ukraine, Chalmers University of Technology; Gothenburg University*
37. **Yan Rybalko** *B.Verkin Institute for Low Temperature Physics and Engineering of NAS of Ukraine*
38. **Valerii Samoilenko** *Institute of Mathematics of NAS of Ukraine*
39. **Yuliia Samoilenko** *Claude Bernard University Lyon 1*
40. **Petro Samusenko** *National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"*
41. **Oksana Satur** *Institute of Mathematics of NAS of Ukraine*
42. **Yevgeniya Semenova** *Institute of Mathematics of NAS of Ukraine*
43. **Oleksiy Shcherbyna** *V.N. Karazin Kharkiv National University*
44. **Dmytro Shepelsky** *B.Verkin Institute for Low Temperature Physics and Engineering of NAS of Ukraine*
45. **Kostyantyn Sirenko** *O.Ya. Usikov Institute for Radiophysics and Electronics, NAS of Ukraine*
46. **Ihor Sokolenko** *Institute of Mathematics of NAS of Ukraine*
47. **Serhii Solodky** *Institute of Mathematics of NAS of Ukraine*
48. **Mykola Staryi** *KAU, Institute of Mathematics of NAS of Ukraine*
49. **Alexander Timokha** *Institute of Mathematics of NAS of Ukraine*
50. **Alisa Tsukanova** *National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute*
51. **Halyna Tuluchenko** *National Technical University "Kharkiv Polytechnic Institute"*
52. **Olena Vaneeva** *Institute of Mathematics of NAS of Ukraine*
53. **Vitaliy Vasylyk** *Institute of Mathematics of NAS of Ukraine*
54. **Oleksandra Vinnichenko** *Institute of Mathematics of NAS of Ukraine*
55. **Iryna Yehorchenko** *Institute of Mathematics of NAS of Ukraine*
56. **Yurii Zhuravlov** *Bogolyubov Institute for Theoretical Physics of NAS of Ukraine*