

Words of Welcome

Dear colleagues and fellow scientists,

On behalf of the Local Scientific Committee, it is my pleasure to welcome you to VI International Conference "Advances in Applied Mathematics of Classical and Quantum Systems" (**AMCQS-VI**) during December 22-24, 2022 in Odessa. The organizer of the conference is the Odessa State Environmental University.

We have set up an exciting program covering a wide variety of cutting edge research topics ranging from method developments to applications pushing the limits of modern Applied Mathematics of Classical and Quantum Systems.

Even though we are sure that the many excellent lectures will make it difficult to decide which of the sessions to select, we hope you will enjoy **ANLOS-VI** 2022 in Odessa.

Sergey Stepanenko	Rector of Odessa State Environmental University, Professor
Olga Khetselius	Professor of Department of Mathematics and Quantum Mechanics
Alexander Glushkov	Head of Department of Mathematics and Quantum Mechanics, Professor
Andrey Svinarenko	Professor of Department of Mathematics and Quantum Mechanics

Local Organizing Committee

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Glushkov A.V., Hab.Dr., Prof., Prof., Head. of Department of Mathematics and Quantum Mechanics (**Co-Chair**)

Svinarenko A.A., Hab.Dr., Prof., Prof. of Department of Mathematics and Quantum Mechanics (**Co-Chair**)

Ignatenko G.V., Hab.Dr., Ass.-Prof., Prof. of Department of Mathematics and Quantum Mechanics

Dubrovskaya Yu.V., PhD Dr., Assoc.-Prof. of Department of Mathematics and Quantum Mechanics

Afanasyeva V.V., Secretary, Department of Mathematics and Quantum Mechanics

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Голова Оргкомітету

Глушков ОВ, д.ф.-м.н, проф, зав. кафедри математики та квантової механіки,
Заст. Голови Оргкомітету

Свинаренко АА д.ф.-м.н, проф. кафедри математики та квантової механіки,
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Дубровська Ю.В., к.ф.-м.н., доц. кафедри математики та квантової механіки,
Афанасьєва В.В., стар. викл. кафедри математики та квантової механіки
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TOPICS:

- **Mathematical physics of classical and quantum systems**
- **Computational methods of dynamics of classical and quantum systems**
- **Fractal Geometry and Chaos Theory (Satellite Symposium)**
- **Theory of generalized coherent states and their application**
- **Selected sections of probability theory, stochastic processes and statistics**
- **Quantum statistics of charged particle systems**
- **Quantum Geometry and Dynamics of Resonances (Satellite Symposium)**
- **Computational foundations of theoretical mechanics of classical systems**
- **Selected sections of computational hydrodynamics**
- **Mathematical modeling of natural processes (selected sections)**
- **Systems theory and methods of optimal control theory**
- **Mathematical and physical models of quantum and neural networks (Satellite Symposium)**
- **Mathematical foundations of quantum computing**
- **Mathematical programming (selected sections)**

PROGRAM OF THE CONFERENCE

Conference meetings will be held remotely, in the form of a Zoom conference. The time and details of access to the conference will be sent by e-mail later.

December 21 (Wednesday):

- 15:00 – Registration of participants of the conference
Регістрація учасників конференції

December 22 (Thursday):

- 10:00 – Opening Ceremony. Congratulations of Chairs O. Khetselius , A. Glushkov
Церемонія відкриття конференції Голови оргкомітету конференції
O. Khetselius “*Greens Function Methods in Quantum Physics and Chemistry: Computational Algorithms*”
- 11:00 – J. Karwowski “*The Schrodinger “ equation with power potentials: Exactly-Solvable Problems*”
- 12.00 – L. Mammino “*Advances in Computational Chemistry and Mathematics*”
13:00 – Dinner / Dinner / Обід
- 14.00 – A. Glushkov, Relativistic bi-spinor Dirac Equation: New Computational Algorithms
- 15.00 – A Ignatenko, “*Dynamical and Topological Invarinats of quantum systems in magnetic field*”
- 16.00 – N. Bykowszczenko “*Advances in Methods of optimal control theory*””

December 23 (Friday):

- 10.00 – P. Kondratenko, “*New computational algorithms in molecular systems*”
- 11.00 – A. Glushkov, “*New Advances in Applied Mathematics of Quantum Systems*”
- 11.00 – O. Khetselius, “*New Advances in Applied Mathematics of Classical Systems*”
13:00 – Dinner / Dinner / Обід
- 14:00 – Yu. Lopatkin “*Overview of Computational methods in quantum Geometry and Algebra*”
- 15.00 – A. Svinarenko, “*New methods of chaos and nonlinear dynamical systems theory*”
- 15:45 – A. Ignatenko “*New computational algorithms in theory of probability and mathematical statistics*”
- 16:15 – Yu. Dubrovskaya, “*New computational schemes in linear algebra*”

December 24 (Saturday):

- 10:00 – T. Koval “*The Green’s function of the relativistic bi-spinor Dirac equation and Antiwronskian*”
- 10:30 – I. Ivanova, “*New algorithms of a chaos-geometric approach to modeling of optical neural network systems*”
- 11:00 – A. Vitavetsky, “*New numerical realizations of S-matrix formalism in quantum mechanics and geometry: New algorithms*”
- 11:30 – K. Kolesnikov, “*Relativistic calculation of spectra and parameters of radiative transitions of heavy atomic systems with elements of dynamic chaos*”
- 12:00 – I.Vakar, A. Glushkov, “*The method of the operator theory of perturbations in the calculations of the characteristics of Stark resonances in the spectra of atoms in a strong electric field*”
- 12:30 – A.Vakar, A. Ignatenko, “*An optimized method of operator perturbation theory in calculating the parameters of Zeeman resonances in the spectra of atomic systems in an intense magnetic field*”

13:00 – Dinner / Dinner / Обід

- 14:00 – O.L. Mykhailov, A. Glushkov, “*Relativistic gauge-invariant one-quasiparticle representation in theory of multielectron systems: New numerical approach*”
 - 14:30 – M. Smischenko, O Khetselius, “*Relativistic calculation of the high-orders corrections of the relativistic perturbation theory*”
 - 15:00 – B. Krynko, stud. (Sci. Adv. Prof. O. Khetselius), “*New algorithms of nonlinear programming in the problems of forecasting the evolution of complex systems*”
 - 15:10 – D. Shelingovskyi, stud. (Sci. Adv. Prof. A. Glushkov), “*New mathematical approach to analysis of evolutionary dynamics for complex radiation-ecological systems based on the theory of integral equations*”
 - 15:20 A. Filenko, stud. (Sci. Adv. Prof. A. Svinarenko) “*A new mathematical method of construction of Sturm developments for accounting states of continuous spectrum*”
 - 15:30 – E. Shevchenko, stud. (Sci. Adv. Prof. O. Khetselius), “*A new applied mathematical approach in modeling and forecasting the evolution of atmospheric-hydrodynamic systems*”
 - 15:40 – M. Veligzhanina, stud. (Sci. Adv. Prof. A. Ignatenko), “*New models in problems of systems theory and optimal control*”
 - 15:50 – M. Skalozub, stud. (Sci. Adv. Prof. O. Khetselius), “*Improved spectral numerical models in the investigation of chaos parameters for complex quantum systems*”
- 16:00 – Closing Session (O. Khetselius, A. Glushkov)

MASTER-CLASS (for BrD, MsD, PhD 113 Students and PostDocs)

Applied Mathematics of Classical and Quantum Systems

**Lecturers: Prof. O.Y. Khetselius Prof. A. Glushkov; Prof. A. Svinarenko;
Prof. A. V. Ignatenko;**

December, 21 2022 TOPICS:

- Mathematical physics of classical and quantum systems
- Computational methods of dynamics of classical and quantum systems
- Fractal Geometry and Chaos Theory
- Theory of generalized coherent states and their application
- Selected sections of probability theory, stochastic processes and statistics
- Quantum statistics of charged particle systems
- Quantum Geometry and Dynamics of Resonances
- Computational foundations of theoretical mechanics of classical systems
- Selected sections of computational hydrodynamics
- Mathematical modeling of natural processes (selected sections)
- Systems theory and methods of optimal control theory
- Mathematical and physical models of quantum and neural networks
- Mathematical foundations of quantum computing
- Mathematical programming (linear, nonlinear, stochastic, neural networks...)