

**XXXVI International Enlarged Sessions of the Seminar  
of Ilia Vekua Institute of Applied Mathematics  
of Ivane Javakhisvili Tbilisi State University  
April 19-21, 2022  
Tbilisi**



**PROGRAM**

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	Vepkhvadze Teimuraz

The peer-reviewed manuscripts will be published. The source tex and the corresponding pdf files of the English version of the talk, prepared using the template (information how to prepare an article, together with a LaTeX template is available for download from [http://www.viam.science.tsu.ge/en\\_ses.htm](http://www.viam.science.tsu.ge/en_ses.htm)) and not exceeding four A4-format pages should be uploaded in the system

<http://www.viam.science.tsu.ge/userspace/login>

before May 31, 2022.

Opening of the Seminar will start on April 20, 2022 at 14:00 using Zoom system (ID number: 519 059 4538).

## **Participating organizations and independent research units**

- A. Razmadze Mathematical Institute of I. Javakhishvili Tbilisi State University (Razmadze Institute of TSU)
- A. Tsereteli Kutaisi State University
- Batumi Shota Rustaveli State University
- European School
- Georgian-American University
- Georgian National University (SEU)
- Georgian Technical University (GTU)
- Gori State University
- I. Javakhishvili Tbilisi State University (TSU)
- Ilia State University
- International Black Sea University
- I. Vekua Institute of Applied Mathematics of I. Javakhishvili Tbilisi State University (Vekua Institute of TSU)
- Kutaisi International University
- Niko Muskhelishvili Institute of Computational Mathematics of the Georgian Technical University (Muskhelishvili Institute of GTU)
- Sokhumi State University
- University of Georgia
- Vladimir Chavchanidze Institute of Cybernetics of the Georgian Technical University (Chavchanidze Institute of GTU)
  
- University of Antwerp, Department of Biosciences Engineering, Belgium
- Bar Ilan University and Ariel University, Israel
- Donetsk National Technical University, Ukraine
- Donetsk National University, Ukraine
- Joint Institute for Nuclear Research, Dubna Moscow region, Russia
- Silesian University of Technology, Poland
- Stevens Institute of Technology, Hoboken, USA
- Technical University of Munich, Munich, Germany
- University of Salerno, Italy

**Wednesday, April 20**

**(Online, using Zoom system, ID number: 519 059 4538)**

**14:00 – 14:20 Opening**

# Section of Mathematical Logic and Foundations

Chairs: Alexander Kharazishvili, Roland Omanadze

Co-chair: Archil Kipiani

**Tuesday, April 19**

(Online, using Zoom system, ID number: 595 452 9647)

**16:00 - 16:20 Mriam Beriashvili** (Vekua Institute of TSU, GTU)

*Certain classes of measures, their cardinality and applications*

**16:20 - 16:40 Irakli Chitaia<sup>1</sup>, Roland Omanadze<sup>2</sup>** (<sup>1</sup>Free University, <sup>2</sup>Department of Mathematics of TSU)

*Degree structures of conjunctive reducibility*

**16:40 - 17:00 Tamar Kasrashvili** (Vekua Institute of TSU, TGU)

*Some properties of algebraic curves*

**17:00 - 17:20 Marika Khachidze** (TGU)

*On an existence of non-measurable set*

**17:20 - 17:40 Slawomir Kusiński** (Silesian University of Technology, Poland)

*Connections between  $K$ -partitions of Baire spaces and precipitous ideals as well as measurable and real-measurable cardinals*

**17:40 - 18:00 Revaz Grigolia<sup>1</sup>, Antonio Di Nola<sup>2</sup>** (<sup>1</sup>Department of Mathematics of TSU, Chavchanidze Institute of GTU, <sup>2</sup>University of Salerno, Italy)

*Dynamic Lukasiewicz logic with application in neural networks*

**18:00 - 18:20 Tengiz Tetunashvili** (Vekua Institute of TSU, GTU)

*On some versions of Mazurkiewicz type sets*

# Section of Applied Logics and Programming

Chair: Matthias Baaz (Austria)

Co-chair: Jemal Antidze, Besik Dundua, Mikheil Rukhaia

**Wednesday, April 20**

(Online, using Zoom system, ID number: 402 402 4002)

**14:30 - 14:50 Mikheil Rukhaia** (Vekua Institute of TSU, International Black Sea University)

*Approximate reasoning techniques*

**14:50 - 15:10 Ana Idadze<sup>1</sup>, Besik Dundua<sup>1,2</sup>, Helmut Seidl<sup>3</sup>** (<sup>1</sup>Kutaisi International University, <sup>2</sup>Vekua Institute of TSU, <sup>3</sup>Technical University of Munich, Munich, Germany)

*Universal first-order safety properties*

**15:10 - 15:30 Lali Tibua** (Vekua Institute of TSU, SEU)

*An overview of uncertain reasoning in predicate logic*

# Section of Number Theory, Algebra and Geometry

Chairs: Mikhail Amaglobeli, George Khimshiashvili, Teimuraz Vepkhvadze, Malkhaz Bakuradze  
Co-chair: Ketevan Shavgulidze

**Wednesday, April 20**

(online, using Zoom system, ID number: 586 848 9206)

**15:00 - 15:20 Ketevan Shavgulidze** (Department of Mathematics of TSU)

*On the generalized theta-series for positive definite nondiagonal quadratic forms of  $r$  variables*

**15:20 - 15:40 Mikheil Amaglobeli<sup>1</sup>, Alexei Myasnikov<sup>2</sup>** (<sup>1</sup>Department of Mathematics of TSU, <sup>2</sup>Stevens Institute of Technology, Hoboken, USA)

*On irreducible algebraic sets over free 2-nilpotent groups*

**15:40 - 16:00 Ilia Tavkhelidze** (Department of Mathematics of TSU)

*About some properties of one special class of the GML bodies*

**16:00 - 16:20 Johan Gielis** (University of Antwerp, Department of Biosciences Engineering, Belgium)

*Lamé-Gielis curves and Rvachev's  $R$ -functions*

**16:20 - 16:40 Teimuraz Vepkhvadze** (Department of Mathematics of TSU)

*Positive integers represented by some binary forms*

**16:40 - 17:00 Tamar Mesabliashvili** (Vekua Institute of TSU)

*A necessary and sufficient condition for the existence of a monoid factorization*

**17:00 - 17:20 Tamari Kvirikashvili** (Department of Mathematics of GTU)

*Projective geometries over lattices and their morphisms*

**17:20 - 17:40 Natia Sazandrishvili** (Ilia State University)

*On the generalized Lifeguard problem*

**17:40 - 18:00 Tengizi Bokelavadze** (Department of Mathematics, Akaki Tsereteli State University)

*Subgroup lattices of Hall's  $W$ -power groups*

# Section of Real Analysis

Chairs: Ushangi Goginava, Leri Gogoladze

Co-chair: Ana Danelia

**Thursday, April 21**

(online, using Zoom system Meeting ID: 753 7066 1227)

**Zaza Goginava is inviting you to a scheduled Zoom meeting.**

**Topic: Zaza Goginava's Zoom Meeting**

**Time: Apr 21, 2022 05:45 PM Dubai**

**Join Zoom Meeting**

**<https://us04web.zoom.us/j/75370661227?pwd=QrKbqd8ISheV1KUHdPkjLtStrNKyUy.1>**

**Meeting ID: 753 7066 1227**

**Passcode: 5kPjcC**

- 18:00 - 18:20 Ushangi Goginava** (Vekua Institute of TSU, Department of Mathematics of TSU)  
*Matrix summability of Walsh-Fourier series*
- 18:20 - 18:40 Larry Gogoladze, Giorgi Cagareishvili** (Department of Mathematics of TSU)  
*On the unconditional convergence of general Fourier series for Lip1 class of functions*
- 18:40 - 19:00 Vaja Tarieladze<sup>1</sup>, Giorgi Chelidze<sup>1,2</sup>, Mikheil Nikoleishvili<sup>1,3</sup>** (<sup>1</sup>Muskhelishvili Institute of GTU, <sup>2</sup>Kutaisi International University, <sup>3</sup>Georgian Institute of Public Affairs)  
*On Maligranda's proof of AM-GM inequality*
- 19:00 - 19:20 Shakro Tetunashvili<sup>1,2</sup>, Tengiz Tetunashvili<sup>1,3</sup>** (<sup>1</sup>GTU, <sup>2</sup>Razmadze Institute of TSU, <sup>3</sup>Vekua Institute of TSU)  
*On reconstruction of coefficients of some almost everywhere divergent orthogonal series*
- 19:20 - 19:40 Vaja Tarieladze<sup>1</sup>, Sergei Chobanyan<sup>1</sup>, Mzevinar Bakuridze<sup>2</sup>** (<sup>1</sup>Muskhelishvili Institute of GTU, <sup>2</sup>Batumi Shota Rustaveli State University)  
*On a 1906's result of L. Fejer*
- 19:40 - 20:00 Nika Areshidze** (Department of Mathematics of TSU)  
*Lebesgue's test for general Dirichlet's integrals*
- 20:00 - 20:20 Natalia Volchkova<sup>1</sup>, Vitaliy Volchkov<sup>2</sup>** (<sup>1</sup>Donetsk National Technical University, Ukraine, <sup>2</sup>Donetsk National University, Ukraine)  
*Erasing of singularities of mean periodic functions on  $S^2$*
- 20:20 - 20:40 Rusudan Meskhia** (Department of Mathematics of TSU)  
*Generalized absolute convergence of double Fourier-Haar series*

# Section of Complex Analysis and Applications

Chair: Grigor Giorgadze

Co-chair: George Akhalaia

**Thursday, April 21**

(Online, using Zoom system, ID number: 471 734 4156, Passcode: 923514)

**11:00 - 11:20 Giorgi Makatsaria<sup>1</sup>, Nino Manjavidze<sup>1</sup>, Giorgi Akhalaia<sup>2</sup>** (<sup>1</sup>Ilia State University, <sup>2</sup>Vekua Institute of TSU)

*Complete singular elliptic systems*

**11:20 - 11:40 Nino Bregvadze** (TSU)

*The sub-Riemannian geometry of the 3-dim sphere*

**11:40 - 12:00 Vagner Jikia** (V. Chavchanidze Institute of Cybernetics of the Georgian Technical University)

*Regularization of the two-particles Coulomb scattering problem. The Coulomb T matrix*

**12:00 - 12:20 Gogi Kezheradze** (TSU)

*On the solutions space of special type Riemann equations*

**12:20 - 12:40 Giorgi Kakulashvili** (TSU)

*On the construction of inverse and invert formal power series*

**12:40 - 13:00 Irakli Sikharulidze** (TSU)

*The Serre duality for generalized analytic function*

**Break**

**14:00 - 14:20 Valeriy Volchkov, Vitaliy Volchkov** (Donetsk National University)

*New properties of solutions of convolution equations*

**14:20 - 14:40 Nugzar Makhaldiani** (Joint Institute for Nuclear Research, Dubna Moscow region, Russia)

*Negative binomial distribution in multiparticle production processes and primordial black holes counting rules*

**14:40 - 15:00 Grigori Giorgadze** (Vekua Institute of TSU, Department of Mathematics of TSU)

*On the index of gradient of real invertible polynomial*

**15:00 - 15:20 Valerian Jikia** (Vekua Institute of TSU)

*The maximum principle for Carleman-Vekua irregular equations*

# Section of Ordinary Differential Equations and Optimal Control

Chairs: Roman Koplatadze, Tamaz Tadumadze  
Co-chair: Tea Shavadze

**Tuesday, April 19**

(Online, using Zoom system, ID number: 628 682 7096)

- 18:00 - 18:20 Tamaz Tadumadze<sup>1</sup>, Shlomo Yanetz<sup>2</sup>** (<sup>1</sup>Vekua Institute of TSU, Department of Mathematics of TSU, <sup>2</sup>Bar Ilan University and Ariel University, Israel)  
*A measurable solution of the functional equation and the existence of an optimal element in the optimal problem with deviating argument*
- 18:20 - 18:40 Mariam Kazaishvili** (Department of Mathematics of TSU)  
*On the existence of an optimal initial data for the controlled quasi-linear neutral equation*
- 18:40 - 19:00 Tea Shavadze<sup>1</sup>, Ia Ramishvili<sup>2</sup>** (<sup>1</sup>Vekua Institute of TSU, Department of Mathematics of GTU)  
*The integral equation equivalent to one class of the controlled neutral differential equation and properties of its kernel*
- 19:00 - 19:20 Akaki Gabelaia** (Department of Computational Mathematics of GTU)  
*On practical experience in predicting the spread of Coronavirus (Covid-19)*
- 19:20 - 19:40 Lela Alkhazishvili, Medea Iordanishvili** (Department of Computer Sciences of TSU)  
*One class of the optimal problem taking into consideration factor of delay and mixed initial condition*
- 19:40 - 20:00 Nika Gorgodze<sup>1</sup>, Eka Bokhua<sup>2</sup>** (<sup>1</sup>Department of Mathematics of A. Tsereteli Kutaisi State University, <sup>2</sup>Department of Mathematics of TSU)  
*On the existence of an optimal element for the quasi-linear neutral optimal problem with several delays*
- 20:00 - 20:20 Bezhan Ghvaberidze** (Department of Computer Sciences of TSU)  
*Development of computer system for knowledge testing using multicriteria discrete optimization*
- 20:20 - 20:40 Keti Gujejiani** (Vekua Institute of TSU)  
 *$n$ -th order essential nonlinear difference equations with Property A and B*
- 20:40 - 21:00 Roman Koplatadze** (Vekua Institute of TSU, Department of Mathematics of TSU)  
*Oscillation criteria for linear ordinary differential equation*

# Section of Partial Differential Equations

Chairs: Temur Jangveladze, Sergo Kharibegashvili, David Natroshvili  
Co-chair: Zurab Kiguradze

**Thursday, April 21**

(Online, using Zoom system, ID number: 935 633 2635, Passcode: gtu2020)

**16:00 - 16:20 Nino Mzhavanadze** (Vekua Institute of TSU)

*On one nonlinear diffusion system*

**16:20 - 16:40 Teimuraz Chkhikvadze** (Vekua Institute of TSU)

*On one system of nonlinear partial differential equations*

**16:40 - 17:00 Tornike Tsertsvadze** (GTU)

*Mixed boundary value problem for the anisotropic Helmholtz type equation*

**17:00 - 17:20 Mikheil Gagoshidze** (Vekua Institute of TSU)

*On numerical solution of one nonlinear partial differential mathematical model*

**17:20 - 17:40 Temur Jangveladze** (Vekua Institute of TSU, GTU)

*On investigation and approximate solution of two systems of nonlinear partial differential equations*

**17:40 - 18:00 Tamar Faiqidze** (Vekua Institute of TSU)

*On a system of fourth-order nonlinear integro-differential equations*

**18:00 - 18:20 Mariam Rashoian, Irine Sigua** (GTU)

*The periodic problem for one class of first order hyperbolic systems*

**18:20 - 18:40 Teona Bibilashvili, Sergo Kharibegashvili** (GTU)

*Darboux type problem for one nonlinear hyperbolic equation of the fourth order*

# Section of Theory of Probability and Mathematical Statistics

Dedicated to the 80th birthday anniversary of Revaz Chitashvili

Chairs: Elizbar Nadaraia, Omar Purtukhia

**Wednesday, April 20**

(Online, using Zoom system, ID number: 891 123 4953)

**15:00 - 15:20 Michael Mania** (Razmadze Institute of TSU)

*The Bellman-Chitashvili equation and an optimal equivalent change of measure*

**15:20 - 15:40 Petre Babilua<sup>1</sup>, Elizbar Nadaraya<sup>1,2</sup>** (<sup>1</sup>Department of mathematics of TSU, <sup>2</sup>Vekua Institute of TSU)

*On the estimate of Bernoulli regression function using Bernstein polynomials for group observations*

**15:40 - 16:00 Revaz Tevzadze** (GTU)

*The representation of the solution of some BSDE*

**16:00 - 16:20 Aleksandre Tkeshelashvili** (Vekua Institute of TSU)

*Some remarks on the absolute continuity for random measures under nonlinear transformations and applications in thermodynamics*

**Break**

**16:40 - 17:00 Zurab Kvatadze, Beqnu Pharjiani, Tsiala Kvatadze** (GTU)

*Local limit theorem for sums of dependent random vectors*

**17:00 - 17:20 Nikoloz Maglaperidze<sup>1</sup>, Elene Maglaperidze<sup>2</sup>** (<sup>1</sup>Georgian American University, <sup>2</sup>Sokhumi State University)

*Monte Carlo simulations for some known probability problems*

**17:20 - 17:40 Omar Purtukhia<sup>1,2</sup>, Vakhtangi Jaoshvili<sup>1</sup>, Ekaterine Namgalauri<sup>2</sup>** (<sup>1</sup>Department of mathematics of TSU, <sup>2</sup>Razmadze Institute of TSU)

*Martingale representation of one non-smooth functional of Brownian motion*

**17:40 - 18:00 Zurab Zerakidze<sup>1</sup>, Omar Purtukhia<sup>2</sup>** (<sup>1</sup>Gori State University, Faculty of Law and Business, <sup>2</sup>Department of mathematics of TSU, Razmadze Institute of TSU)

*Consistent criterion of hypothesis testing and consistent estimator of parameter in the Hilbert space of measures*

# Section of Mathematical Modeling and Numerical Analysis

Dedicated to the 85th anniversaries of Tamaz Vashakmadze

Chairs: Teimuraz Davitashvili, Jemal Rogava, Tamaz Vashakmadze

Co-chair: Archil Papukashvili

**Wednesday, April 20**

(Online, using Zoom system, ID number: 201 249 2642)

- 11:00 - 11:20 Tamaz Vashakmadze** (Vekua Institute of TSU, Department of Mathematics of TSU)  
*To numerical realisation of the hierarchical model of I. Vekua*
- 11:20 - 11:40 Jemal Rogava** (Vekua Institute of TSU, Department of Numerical Analysis and Computational Technologies of TSU)  
*Decomposition type formulas for approximation of a cosine operator function*
- 11:40 - 12:00 David Gulua** (GTU)  
*The algorithm for numerical realization of multilayer semi-discrete schemes of solution of an abstract evolutionary problem*
- 12:00 - 12:20 Jemal Peradze** (Department of Mathematics of TSU)  
*On the accuracy of a projection method for a nonlinear parabolic equation*
- 12:20 - 12:40 Nino Khatiashvili** (Vekua Institute of TSU)  
*On the fluid flow over the rectangular areas*
- 12:40 - 13:00 Archil Papukashvili<sup>1</sup>, Giorgi Geladze<sup>1</sup>, Zurab Vashakidze<sup>2</sup>, Meri Sharikadze<sup>1</sup>**  
(<sup>1</sup>Vekua Institute of TSU, <sup>2</sup>School of Science and Technology, The University of Georgia)  
*On the algorithm of an approximate solution and numerical computations for J. Ball nonlinear integro-differential equation*

**Break**

- 15:00 - 15:20 Edison Abramidze** (Muskhelishvili Institute of GTU)  
*Research of the stress state of flexible multilayered corrugated cylindrical shells of rotation according to a refined theory*
- 15:20 - 15:40 Temur Chilachava** (Sokhumi State University)  
*On the propagation of an explosive shock wave in a homogeneous gravitating three-axis gas ellipsoid of rotation*
- 15:40 - 16:00 Zviad Tsiklauri** (GTU)  
*Numerical solution of non-linear integro-differential beam equation*
- 16:00 - 16:20 Teimuraz Davitashvili** (Vekua Institute of TSU)  
*Numerical modeling of the dynamics of the air flow and the study of some of its energy characteristics*

# Section of Mechanics of Continua

Dedicated to the 85th birthday anniversary of Tengiz Meunargia

Chairs: George Jaiani

Co-chair: Natalia Chinchaladze

**Wednesday, April 20**

(online, using Zoom system, ID number: 519 059 4538)

- 14:30 - 14:50 George Jaiani** (Vekua Institute of TSU, Department of Mathematics of TSU)  
*Governing equations for continuity equation in the case of prismatic shell-like domains within the framework of hierarchical models*
- 14:50 - 15:10 Gia Avalishvili<sup>1</sup>, Mariam Avalishvili<sup>2</sup>** (<sup>1</sup>TSU, <sup>2</sup>University of Georgia)  
*Two-dimensional models of thermoelastic shells within the framework of the Chandrasekharaiah-Tzou theory*
- 15:10 - 15:30 Bakur Gulua<sup>1,2</sup>, Miranda Narmania<sup>3</sup>** (<sup>1</sup>Vekua Institute of TSU, Sokhumi State University, <sup>3</sup>University of Georgia)  
*Solution of some problems for the elastic material with voids in  $N=1$  approximation of Vekua's theory*
- 15:30 - 15:50 Giorgi Kapanadze<sup>1,2</sup>, Lida Gogolauri<sup>2</sup>** (<sup>1</sup>Vekua Institute of TSU, <sup>2</sup>Razmadze Institute of TSU)  
*The problem of finding an equally strong contour for the viscoelastic rectangular region*
- 15:50 - 16:10 Natalia Chinchaladze** (Vekua Institute of TSU, Department of Mathematics of TSU)  
*On a problem in  $N=0$  approximation of hierarchical models of incompressible fluid*
- 16:10 - 16:30 Roman Janjgava** (Vekua Institute of TSU, SEU)  
*On shallow shells consisting of a binary mixture with voids*

**Break**

- 16:50 - 17:10 Natela Zirakashvili** (Vekua Institute of TSU)  
*Analytical solution of some boundary value problems of elasticity in bipolar coordinate system*
- 17:10 - 17:30 Bachuki Pachulia** (GTU)  
*The bending problem of elastic rectangular plate with rigid inclusion*
- 17:30 - 17:50 Varden Tsutskiridze** (GTU)  
*Magnetohydrodynamic flow of fluid in a circular pipe with account of the volum sources and sink mas*
- 17:50 - 18:10 Kosta Svanadze** (Department of mathematics of A. Tsereteli Kutaisi State University)  
*The problem of statics of the theory of elastic mixture of defining a hole of uniform strength in a polygonal plate*