

**XXIX Enlarged Sessions of the Seminar of  
Ilia Vekua Institute of Applied Mathematics (VIAM) of  
Ivane Javakhisvili Tbilisi State University (TSU)  
April 22–24, 2015**

**Program**



**Opening - April 22, Wednesday, 14:00,  
Ilia Vekua Lecture Hall in VIAM**

## Organizing committee

G. Jaiani (Chairman)	Z. Kiguradze
N. Avazashvili (Vice-chairman)	R. Koplatadze
N. Chinchaladze (Vice-chairwoman)	T. Meunargia
M. Rukhaia (Scientific Secretary)	E. Nadaraia
M. Gabelaia (Secretary)	D. Natroshvili
M. Amaglobeli	R. Omanadze
J. Antidze	J. Rogava
G. Axalaia	Kh. Rukhaia
M. Baaz (Austria)	M. Svanadze
G. Giorgadze	A. Kipiani
U. Goginava	O. Purtukhia
L. Gogoladze	K. Shavgulidze
<u>D. Gordeziani</u>	J. Sharikadze
T. Davitashvili	A. Kharazishvili
A. Danelia	S. Kharibegashvili
T. Vashakmadze	N. Khatiashvili
T. Vepkhvadze	G. Khimshiashvili
T. Tadumadze	T. Jangveladze
T. Kaladze	

In the case of co-authors the speaker's name is underlined

The peer-reviewed manuscripts will be published. The source TEX-file and the corresponding Pdf file of the English version of the talk, not exceeding four A4-format pages should be sent to the editorial board of the Reports of Enlarged Sessions of the Seminar of I. Vekua Institute of Applied Mathematics before May 31 at the following address:

[viam.enlarged@gmail.com](mailto:viam.enlarged@gmail.com)

Opening of the Seminar will start on April 22, 2015 at 14:00 in I. Vekua Institute of Applied Mathematics (University str. 2, 0186 Tbilisi, Georgia).

As usual on April 23 at 16:00 a visit to the grave of Ilia Vekua at the Mtatsminda Pantheon is planned.

**Wednesday, April 22**  
**Ilia Vekua Lecture Hall (VIAM)**

**14:00**    **Opening**

# Section of Foundations of Mathematics and Mathematical Logic

Chairmen – A. Kharazishvili , R. Omanadze

Co-Chairman – A. Kipiani

**Thursday, April 23**

**Auditory # 254 (VIAM)**

**12:00 – 12:20** **R.Omanadze.** Q-degrees of d-c.e.sets

**12:25 – 12:45** **R. Grigolia, A. Di Nola, G. Lenzi.** The quasi variety, generated by perfect Chang algebra  $C$  , coincides with the variety, generated by perfect Chang algebra  $C$

**12:50 – 13:10** **G. Pantsulaia.** Solovay model and duality between the measure and the Baire category in a Polish topological vector space  $H(X, S, \mu)$

**13:15 – 13:35** **T. Tetunashvili.** On families of independent sets, generated by convex sets

**13:40 – 14:00** **T. KasraShvili.** Set-theoretical invariants in topics of Euclidean geometry

**14:05 – 14:25** **M. BeriaSvili.** On some properties of classical Bernstein sets

**14:30 – 14:50** **A. Kipiani.** Some combinatorial properties of functions

# Section of Applied Logics and Programming

Chairman – M. Baaz

Co-Chairmen – J. Antidze, Kh. Rukhaia

**Wednesday, April 22**

**Auditory # 224 (VIAM)**

- 15:00 – 15:20** **J. Antidze.** One approach to establishing the correctentness of the sentence contents in natural languages
- 15:25 – 15:45** **K. Pkhakadze, M. Chikvinidze, G. Chichua, I. Beriashvili, D. Kurckhalia, N. Pkhakadze, A. Maskharashvili.** In the European Union with the Georgian language - The aims and basis of the project “One more step towards Georgian talking self-developing intellectual corpus”
- 15:50 – 16:10** **M. Rukhaia.** Cut-elimination in proof schemata
- 16:15 – 16:35** **L. Kurtanidze.** About correspondence between proof schemata and unranked logics
- 16:40 – 17:00** **G. Fedulov, N. Iashvili, L. Tibua.** Fast algorithms to find the bounds of objective functions
- 17:05 – 17:25** **G. Iashvili.** Flexible block algorithm for a symmetric encryption of information
- 17:30 – 17:50** **A. Bishara.** About semantic web technologies

# Section of Number Theory, Algebra and Geometry

Chairmen – M. Amaglobeli, T. Vepkhvadze, G. Khimshiashvili  
Co-Chairwoman – K. Shavgulidze

**Wednesday, April 22**

**Auditory # 220 (XI building of TSU)**

- 15:00 – 15:20** **M. Amaglobeli.** 2-nilpotent varieties of the exponential MR-Groups
- 15:25 – 15:45** **T. Vepkhvadze.** Representation of numbers by binary quadratic forms, belonging to multi-class genera
- 15:50 – 16:10** **K. Shavgulidze.** On the space of spherical polynomials with quadratic forms of five variables
- 16:15 – 16:35** **V. Lomadze.** Controllability as a minimality condition
- 16:40 – 17:00** **M. Bakuradze.** Calculation of some rational and integral complex elliptic genera
- 17:05 – 17:25** **L. Tavkhelidze, M. Rogava, L. Roinishvili.** Generalised Möbius-Listing's bodies and some different forms of their movements - geometric approach (analytic representation, geometric meaning, decomposition of "complex" movement into elementary displacements)
- 17:30 – 17:50** **R. Surmanidze.** Small valence invariant tensor fields on some homogeneous Riemann spaces and Shur's polynomials

# Section of Real Analysis

Chairmen – U. Goginava, L. Gogoladze  
Co-Chairwoman – A. Danelia

**Wednesday, April 22**

**Auditory # 332 (XI building of TSU)**

- 15:00 – 15:20** **A.Gogatishvili, T. Kopaliani.** Extensions of Rubio De Francia's extrapolation theorem in variable Lebesgue spaces and some applicati
- 15:25 – 15:45** **G. Nadibaidze.** On the summability of series with respect to rearranged block-orthonormal systems
- 15:50 – 16:10** **A. Danelia.** On some local properties of the conjugate function in the class of continuous functions
- 16:15 – 16:35** **Sh. Zviadadaze.** On the upper and lower estimates of norms in variable exponent Lebesgue spaces
- 16:40 – 17:00** **T. Akhobadze.** On the summability of trigonometric Fourier series
- 17:05 – 17:25** **G. Chelidze, B. Mamphoria.** On the positive definiteness of block matrices
- 17:30 – 17:50** **U. Goginava, A. Sahakian.** Convergence of multiple Fourier series of functions of bounded generalized variation
- 17:55 – 18:15** **L. Gogoladze, V. Tsagareishvili.** Estimates of Fourier coefficients by moduli of continuity
- 18:20 – 18:40** **V. Tsagareishvili, L. Gogoladze.** On the convergence of Fourier series of functions of bounded variation with respect to general orthonormal systems

# Section of Complex Analysis and Applications

Chairman – G. Giorgadze  
Co-Chairman – G. Akhalaia

**Wednesday, April 22**  
**Ilia Vekua Lecture Hall (VIAM)**

- 15:00 – 15:20** **V. Paatashvili.** Variable exponent Smirnov classes in multiply connected domains
- 15:25 – 15:45** **E. Pesetskaya.** Analytic solutions of the heat conduction in doubly periodic 2D composite materials
- 15:50 – 16:10** **G. Akhalaia.** On the generalized principle of the argument
- 16:15 – 16:35** **G. Giorgadze, N. Manjavidze.** On the constructive methods for the matrix Riemann-Hilbert boundary value problem
- 16:40 – 17:00** **Valerian Jikia.** On the dimension of solutions space having polynomial asymptotic at infinity of some elliptic systems
- 17:05 – 17:25** **G. Makatsaria, D. Shulaia.** Some classes of third kind integral equations in real and complex domains
- 17:30 – 17:50** **N. Avazashvili.** Mechanical reproduction of one family of transcendental curves
- 17:55 – 18:15** **G. Kakulashvili.** On some formulas for the spherical geometry
- 18:20 – 18:40** **N. Makhaldiani.** Dynamics and Renormdynamics of QCD
- 18:45 – 19:05** **I. Lomidze, Vagner Jikia.** Euler beta-function relation with Dirac  $\delta$ -function. New integrals
- 19:10 – 19:30** **I. Lomidze, N. Chachava.** Polynomial roots' separation and the algorithmic method of polynomials classification



# Section of Ordinary Differential Equations and Optimal Control

Chairmen- T. Tadumadze, R. Koplataдзе

**Friday, April 24**  
**Auditory # 256 (VIAM)**

- 13:00 – 13:20** **T. Tadumadze.** Initial data optimization and inverse problems for some classes of neutral functional differential equations
- 13:25 – 13:45** **N. Gorgodze.** Variation formulas of solution and initial data optimization problems for quasi-linear neutral functional differential equations with the continuous initial condition.
- 13:50 – 14:10** **B. Ghvaberidze.** Multi-criteria vehicle routing problem for extreme environment
- 14:15 – 14:30** **Break**
- 14:35 – 14:55** **P. Dvalishvili.** Continuous dependence of the functional minimum on parameters in the optimal control problems with distribute delay
- 15:00 – 15:20** **M. Bobokhidze.** Oscillation criteria for higher order almost linear functional differential equations
- 15:25 – 15:45** **Zh. Tskipurishvili.** On higher order generalized Emden-Fowler differential equations with delay argument
- 15:50 – 16:10** **R. Koplataдзе.** On asymptotic behavior of solutions of functional differential and discrete equations
- 16:15 – 16:35** **O. Kikvidze, Z. Turdalieva.** Experimental investigation of material's strain and damage in the corrosive environment

# Section of Partial Differential Equations

Chairmen – D. Natroshvili, S. Kharibegashvili, T. Jangveladze  
Co-Chairman – Z. Kiguradze

**Wednesday, April 22**  
**Auditory # 227 (VIAM)**

- 15:00 – 15:20** Z. Kiguradze, M. Kratsashvili. On one two-dimensional model based on Maxwell system
- 15:25 – 15:45** M. Gagoshidze, M. Aptsiauri. Approximate solution of one-dimensional nonlinear Maxwell model with heat conductivity term
- 15:50 – 16:10** B. Tabatadze, M. Nikolishvili. Parabolic regularization of one-dimensional analog of one nonlinear biological model
- 16:15 – 16:35** N. Kachakhidze, Z. Tsiklauri, J. Peradze, N. Khomeriki. Chipot's method for Kirchhoff's one-dimensional static equation
- 16:40 – 17:00** T. Jangveladze. On two systems of nonlinear partial differential equations
- 17:05 – 17:25** D. Natroshvili, D. Ivanidze, M. Ivanidze. About setting of the dynamical problems of the theory of thermo-electro-magneto elasticity

# Section of Probability Theory and Mathematical Statistics

Chair – E. Nadaraya

Co-Chairman – O. Purtukhia

**Wednesday, April 22**

**Auditory # 335 (XI building of TSU)**

- 15:00 – 15:20** E. Nadaraya, P. Babilua, G. Sokhadze. On estimation of functionals of the Gasser-Muller regression function
- 15:25 – 15:45** N. Vakhania, V. Kvaratskhelia, V. Tarieladze. Some remarks on unconditional convergence of series in Banach spaces
- 15:50 – 16:10** M. Shashiashvili. Stability estimates for the multidimensional elliptic obstacle problem
- 16:15 – 16:35** T. Buadze, Z. Khechinashvili, G. Sokhadze. On the Fernique -Skorokhod type integral
- 16:40 – 17:00** B. Mamporia. Stochastic differential equations in a Banach space, main methods and directions

**Thursday, April 23**

**Auditory # 335 (XI building of TSU)**

- 14:00 – 14:20** M. Mania, R. Tevzadze. Relations of value functions of primal-dual problems
- 14:25 – 14:45** G. Sokhadze, A. Tkeshelashvili, M. Patsatsia. On the representation of solution of the second order differential equation with random coefficients
- 14:50 – 15:10** M. Mumladze, Z. Zerakidze. Some notes on the consistent criteria for checking hypotheses
- 15:15 – 15:35** L. Alksidze, Z. Zerakidze. On the existence of consistent criteria of checking hypotheses for Gaussian homogeneous statistical structures
- 15:40 – 16:00** L. Eliauri, Z. Zerakidze. On the existence of consistent criteria of checking hypotheses for Stationary Gaussian statistical structures

**Friday, April 24**  
**Auditory # 335 (XI building of TSU)**

- 14:00 – 14:20** **P. Babilua, B. Dochviri, V. Japshvili.** On estimation of the coefficients of chemical reaction
- 14:25 – 14:45** **O. Purtukhia.** Martingal representation of Wiener functionals
- 14:50 – 15:10** **S. Eloshvili.** Probability geometry, testing of hypothesis
- 15:15 – 15:35** **R. Chartolani, V. Kechakhmadze, Z. Kvatadze.** Analysis of factors of ranging of the state professional educational institutions of Georgia
- 15:40 – 16:00** **T. Kiria.** On a certain objective infinite sample consistent estimate of an average quadratic deviation

# Section of Mechanics of Continua

Chairmen – T. Meunargia, J. Sharikadze, G. Jaiani  
Co-Chairwoman – N. Chinchaladze

**Wednesday, April 22**  
**Auditory # 115 (VIAM)**

**Open presentation day of the Project 30/28**

- 15:00 – 15:20** **G. Jaiani.** Construction and investigation of an equivalent single layer model for calculation of multilayer elastic isotropic structures
- 15:25 – 15:45** **G. Avalishvili, M. Avalishvili, D. Gordeziani.** Construction and investigation of hierarchical models of elastic multistructures consisting of two multilayered bodies, plates, and rods
- 15:50 – 16:10** **N. Chinchaladze.** On calculation of some structures with complicated geometry, widely-distributed in practice
- 16:15 – 16:30** **Break**
- 16:35 – 16:55** **T. Vashakmadze.** Construction and investigations of nonlinear pattern models of elastic multistructures with complicated geometry
- 17:00 – 17:20** **D. Patariaia.** Calculation of elastic structures with complicated geometry by engineering methods
- 17:25 – 17:45** **J. Rogava.** A perturbation algorithm for realization of an implicit three-layer semi-discrete scheme
- 17:50 – 18:10** **A. Papukashvili.** On a numerical method of approximate solution of boundary-contact problems for some multistructural bodies with complicated geometry

**Friday, April 24**  
**Auditory # 115 (VIAM)**

- 11:30 – 11:50** **L. Bitsadze, I. Tsagareli.** On boundary value problems of the fully coupled poroelasticity theory for a spherical layer with double porosity
- 11:55 – 12:15** **N. Zirakashvili.** Formulation of the fictitious load method in the polar coordinate system for problems of the theory of elasticity
- 12:20 – 12:40** **T. Meunargia.** Neutral surfaces of a non-shallow shell

- 12:45 – 13:05** **N. Odishelidze.** A mixed problem of plate bending weakened with a required full-strength hole
- 13:10 – 13:30** **K. Svanadze.** On solving of some problems of statics of the theory of elastic mixtures
- 13:35 – 13:55** **B. Gulua.** Solution of some basic boundary value problems in the  $N=2$  approximation of I.Vekua's hierarchical models of the second type
- 14:00 – 14:20** **G. Kapanadze.** On a problem of the plane theory of elasticity for a finite polygonal domain with a circular hole
- 14:25 – 14:45** **J. Janjgava.** Approximate solution of some plane problems of stress concentration in the moment theory of elasticity

# Section of Mathematical Modeling and Numerical Analysis

Chairmen – D. Gordeziani, T. Vashakmadze , J. Rogava  
Co-Chairman – T. Davitashvili

**Wednesday, April 22**  
**Auditory # 118 (VIAM)**

- 14:30 – 14:50** **G. Gabrichidze.** Some specific aspects of modelling of behaviour of the high arch dams located in seismically active regions
- 14:55 – 15:15** **T. Vashakmadze.** On the construction of von Karman-Koiter type refined ????? theories for elastic shells
- 15:20 – 15:40** **M. Bibiluri.** The boundary value problem posed in an infinite domain for one equation of transfer theory
- 15:45 – 16:05** **D. Gulua, J. Rogava.** The use of a method of small parameter for splitting of the multilayer scheme
- 16:10 – 16:30** **G. Avalishvili, M. Avalishvili.** On hierarchical models of multi-structures consisting of elastic plate and rods
- 16:35 – 16:55** **A. Papukashvili.** On numerical solution of antiplane problems of elasticity theory for composite bodies weakened by cracks
- 17:00 – 17:20** **G. Geladze.** Numerical modelling of some kinds of humidity processes
- 17:25 – 17:45** **T. Davitashvili, G. Gubelidze, M. Sharikadze.** On one nonlinear mathematical model for hydraulic calculation of branched gas pipeline

# Section of Physical and Mathematical Modeling of Problems of Physics and Biology

Chairmen – T. Kaladze, N. Khatiashvili

## Wednesday, April 22 Auditory # 133 (VIAM)

- 15:00 – 15:20** N. Khatiashvili, K. Pirumova, I. Khatiashvili. Influence of the cancer proteins on the blood flow and metabolism
- 15:25 – 15:45** V. Akhobadze, N. Khatiashvili, K. Pirumova. On some pathologies at the human body connected with the crystallization processes
- 15:50 – 16:10** D. Gamrekeli, V. Akhobadze. On some aspects of quantum biophysics
- 16:15 – 16:35** **G. Mamatsashvili.** Subcritical turbulence in plane shear flows – self-sustenance via interplay of linear transient growth and nonlinear inverse cascade
- 16:40 – 17:00** T. Marsagishvili, M. Machavariani, G. Tatishvili, R. Khositashvili, N. Ananiashvili, J. Metreveli, M. Kikabidze-Gachechiladze. Nano-sensors for the modeling of radiation processes
- 17:05 – 17:25** **Z. Osmanov.** On the novel mechanism of particle acceleration

## Friday, April 24 Auditory # 133 (VIAM)

- 14:35 – 14:55** **A. Khelashvili.** Dynamical symmetries in relativistic quantum mechanics (Dirac theory)
- 15:00 – 15:20** **T. Kaladze.** Modified KdV equation for solitary magnetized Rossby waves in the ionospheric E-layer
- 15:25 – 15:45** **L. Tsamalashvili.** Some exact solutions of the nonlinear 2D Burgers equation
- 15:50 – 16:10** Kh. Chargazia, O. Kharshiladze. Simulation of Burridge-Knopoff model of the earthquakes
- 16:15 – 16:35** M. Svanidze, G. Chonishvili, A. Gongadze, A. Iashvili, I. Iashvili, L. Kakabadze, G. Kapanadze, E. Tskhadadze, Y. Verbertsky. Angular distribution of extensive air showers by TEL -array under GELATICA experiment