



# VU INSTITUTE OF MATHEMATICS AND INFORMATICS



Akademijos 4, LT-08663 Vilnius  
Tel. (+370 5) 2109 300, fax (+370 5) 2729209  
E-mail: [info@mii.vu.lt](mailto:info@mii.vu.lt)  
WWW: <http://www.mii.lt>

**Director** – Prof. Habil. Dr. *Gintautas Dzemyda*

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## 1. STAFF

69 research fellows (19 habilitated doctors and 41 doctors), 55 doctoral students

## 2. MAIN RESEARCH TREND OF THE INSTITUTE

- Integrated Development of Mathematics, Informatics and Information Technologies for the Knowledge Society Advanced Products and Services

## 3. DOCTORAL DISSERTATIONS MAINTAINED IN 2012

- 1) **Santa Račkauskienė** - *in Mathematics* (01 P),  
Scientific Supervisor **prof. dr. habil. Antanas Laurinčikas**;  
[„Joint Universality of Zeta-Functions with Periodic Coefficients“](#) (abstract, [dissertation](#)).
- 2) **Liudvikas Kaklauskas** - *in Informatics* (09 P),  
Scientific Supervisor **prof. dr. habil. Leonidas Sakalauskas**;  
[„Study and Application of Methods of Fractal Processes Monitoring in Computer Networks“](#)  
([abstract](#), [dissertation](#)).
- 3) **Lijana Stabingienė** - *in Informatics* (09 P),  
Academic Consultant **prof. dr. Kęstutis Dučinskas**;  
[„Image Analysis Using Bayes Discriminant Functions“](#) (abstract, [dissertation](#)).
- 4) **Ernestas Filatovas** - *in Informatics Engineering* (07 T),  
Scientific Supervisor **dr. Olga Kurasova**;  
[„Solving Multiple Criteria Optimization Problems in an Interactive Way“](#) (abstract, [dissertation](#)).
- 5) **Aleksandr Igumenov** - *in Informatics Engineering* (07 T),  
Scientific Supervisor **prof. dr. Julius Žilinskas**;  
[„Electrical Energy Aware Parallel And Distributed Computing“](#) (abstract, [dissertation](#)).
- 6) **Svetlana Kubilinskienė** - *in Informatics Engineering* (07 T),  
Scientific Supervisor **prof. dr.(HP) Valentina Dagienė**;  
[„Extended Metadata Model for Digital Learning Resources“](#) (abstract, [dissertation](#)).
- 7) **Rasa Lileikytė** - *in Informatics Engineering* (07 T),  
Scientific Supervisor **prof. dr. habil. Laimutis Telksnys**;  
[„Quality Estimation of Speech Recognition Features“](#) (abstract, [dissertation](#)).
- 8) **Saulius Preidys** - *in Informatics Engineering* (07 T),  
Scientific Supervisor **prof. dr. habil. Leonidas Sakalauskas**;  
[„The Application of Datamining Methods to Personalised Learning Environments“](#)  
([abstract](#), [dissertation](#)).
- 9) **Žilvinas Vaira** - *in Informatics Engineering* (07 T),  
Scientific Supervisor **prof. dr.(HP) Albertas Čaplinskas**;  
[„Investigation, Improvement and Development of Aspect-Oriented Design Patterns“](#)  
([abstract](#), [dissertation](#)).

## 4. CONFERENCES AND SEMINARS ORGANIZED IN 2012

- [4<sup>th</sup> International Seminar "Data Analysis Methods for Software Systems"](#),  
December 6-8, 2012, Vilnius, Lithuania
- [3<sup>rd</sup> International doctoral Consortium "Informatics and Informatics Engineering Education Research: Methodologies, Strategies and Implementation"](#),  
November 27-December 2, 2012, Vilnius, Lithuania
- [10<sup>th</sup> International Baltic Conference on Databases and Information Systems \(BalticDB&IS 2012\)](#),  
July 8-11, 2012, Vilnius, Lithuania
- [25<sup>th</sup> European Conference on Operational Research](#),  
July 8-11, 2012, Vilnius, Lithuania
- [International Workshop "Stochastic Programming for Implementation and Advanced Applications" \(STOPROG-2012\)](#),  
July 3-6, 2012, Neringa, Lithuania
- International conference "Challenges of learning informatics in XXI<sup>st</sup> century"  
May 15-20, 2012, Vilnius, Lithuania

## 5. RESEARCH AT IMI DEPARTMENTS

### 5.1. INFORMATICS METHODOLOGY DEPARTMENT

Akademijos 4, LT-08663 Vilnius  
Tel. +370 210 9732  
E-mail: [valentina.dagiene@mii.vu.lt](mailto:valentina.dagiene@mii.vu.lt)  
**Head** – Prof. Valentina Dagiienė

#### **Principal researchers:**

1. Prof. Dr. (HP) Valentina Dagiienė

#### **Senior researchers:**

1. Dr. Tatjana Jevsikova
2. Dr. Jevgenij Kurilov

#### **Technical assistants:**

1. Remigijus Andžius
2. Martynas Budriūnas
3. Viktoras Dagys
4. Antanas Grincevičius
5. Bronius Skūpas
6. Jūratė Skūpienė
7. Agnė Strelkauskytė

#### **Affairs manager:**

1. Giedrė Svetikienė

#### **Doctoral students:**

1. Eglė Jasutė
2. Anita Juškevičienė
3. Silvija Sėrikovienė
4. Bronius Skūpas
5. Jūratė Urbonienė
6. Lina Zajančauskienė
7. Inga Žilinskienė

## ***RESEARCH INTERESTS***

Computer Science Education Research; TechnologyBased Learning; Teaching Programming; Localization of Digital Resources; Models of Quality Evaluation of Educational System Components, Adaptive Learning Research, Olympiads in Informatics.

## ***RESEARCH PROJECTS CARRIED OUT IN 2012***

### **Projects Supported by University Budget**

Theme: Research on engineering decision makings for technology-based education, as well as software localization.

Main tasks and outcomes: 1) derivation of basic informatics concepts and prove their appropriateness to use in contest; 2) development of semi-automated system for evaluation programming assignments; 3) analysis of peculiarities of localization digital resources, 4) development of methods and models for evaluation of the quality of education system components.

### **Projects, Programmes, Issues Supported by Lithuanian State Science and Studies Foundation**

Support for a scientific event Informatics at school: the basic concepts, innovations and research“. 2012-04-25, No. MOR-001/2012/ LSS-580000-944, (registration No. MOR-12007)

Support for a scientific event „Informatics engineering education research: methodologies, methods and practice“. 2012-10-01, No. MOR-052/2012/ LSS-580000-2294, (registration No. MOR-12149)

### **Governmental Science Programmes and Research Projects Ordered by the Branch Ministries**

The project „Realization of postdoctoral (post doc) internship in Lithuania“ (Programs of human resource development actions, means for stimulating scientific works of students and mobility of scientists and other researchers). V. Grybauskienė 2010-12-13, No. 58/MTDS-580000-2033, (financing and management agreement No. VP1-3.1-ŠMM-01-V-01-001)

The means „Stimulations of students' scientific works and mobility of scientists and other researchers“ of the 3<sup>rd</sup> priority programme for developing human resources, the project stimulation of students scientific activity, carried out according to the financing and management agreement No. VP1-3.1-ŠMM-01-V-02-003, signed on November 30, 2011 between European Social Foundation Agency, Ministry of Education and Science and the Lithuanian Science Council; scientific practice of students in summer (student Sandra Brusokaitė, supervisor Dr. Tatjana Jevsikova, the term of practice from 02-07-2012 to 02-09-2012, agreement No. SMP 009 / SMP 12-069.

### **Ordered Research Projects**

The EU structural Funds Project „**Science for business and society**“ in line with the realization means „Inogeb LT-1“ (November 11, 2009) of the LR Economic growth action programme in 2007-2013, of the 1<sup>st</sup> priority „Scientific research and technology development meant for competitive ability of economy and economic growth“, code of the Project No. S-VP2-1.4-ŪM-03-K-01-019.

„**Services of localization of computer teaching-aided means**“. To localize (i.e. to adapt to the Lithuanian linguistic, cultural, and educational environment) packages of computer-aided

teaching tools, intended for primary class school-children (also for that having special education needs). Agreement of services No. F5-155(9.28), May 20, 2010.

Project of EU Structural Funds. The realization means „Lithuanian language in an informatikon society“ of the economic growth action programme priority „Informatikon society for everyone“. **Development and verification work of the Lithuanian term bank** 2012-03-30, No. VP2-3.I-IVPK-12-K-01-004/ LSS-180000-642.

### **International Science Programmes and Projects**

Project „[te@ch.us](mailto:te@ch.us)“ – Learning community for Web 2.0 teaching, Project No.504333-LLP-1-2009-1-DE-COMENIUS-CMP, according to the Web 2.0 EU programme of lifelong learning, December 29, 2009, Grant Agreement No. 2009-3937/001-00.

### **COOPERATION**

Aalto university (Finland): V. Dagienė has Special course in computing education research for doctoral students (T-106.6500)

Davidson Institute of Science Education, Weizmann Institute of Science, Israel

University of Eastern Finland of Joensuu and Kuopio

Malta University

Brunel University, Uxbridge, UK

University of the Basque Country, Spain

University of Las Palmas de Gran Canaria, Spain

Ljubljana University, Slovenia

Munster University, Germany

Frei University Berlin, Germany

University of Iceland

Groningen University

Eindhoven University of Technology

### **OTHER SCIENTIFIC ACTIVITIES**

**V. Dagienė** (<http://ims.mii.lt/valentina/en/index.htm>)

- Editor-in-Chief of two international journals “Informatics in Education“ (since 2002) and “Olympiads in Informatics”

- Expert of EU Eurostars Programme

- Representative of Lithuanian Education Committee TC3 under the International Federation for Information Processing (IFIP)

- Vice chair of the Technical Committee of IFIP for Education (TC3)

- Member of Steering Committee of the International Olympiads in Informatics

- Chair of the Annual International Workshop on Contest on Informatics and Computer Fluency May, Druskininkai)

- Chair of the 3rd international doctoral consortium on informatics engineering education research: methodologies, methods, and practice, December 3-7, 2012, Druskininkai: member of organizing committee

- Chair of the World Congress on Computer in Education (June 2-5, WCCE 2013)

- Member of Doctoral Thesis Defence Committees (Ireland, Finland)

- Supervisor of international doctoral student exchange (2 students: from Croatia and from Spain)

## **J. Kurilov**

- Member of Steering Committee of European Schoolnet(or EUN, the network of 31 European Ministries of Education)
- Member of Lithuanian national CEDEFOP and ReferNet Committees
- Expert-evaluator: PHARE, Leonardo da Vinci, eContentplusprogrammes, European Regional Development Fund
- Expert on preparation of feasibility studies and project documentation: European Commission, Ministry of - Education and Science of Lithuania, Central Project Management Agency under the Ministry of Finance of Lithuania
- Member of journals editorial boards and reviewer:
  1. Scientific journal “International Journal of Knowledge Society Research” (IJKSR, IGI Global) <http://www.igi-global.com/journal/international-journal-knowledge-society-research/1180> : Co-Editor Europe. ISSN: 1947-8429
  2. Scientific journal “Journal of Engineering and Computer Innovations” (JECI, Academic Journals). <http://www.academicjournals.org/JECI/index.htm> : associate editor, reviewer. ISSN 2141-6508
  3. Scientific journal “International Journal On Advances in Software” (IARIA journal, USA). <http://www.iariajournals.org/software/index.html> : member of editorial board, reviewer. ISSN 1942-628
  4. Scientific journal “Informatics in Education” (Vilnius University, Lithuania). [http://www.mii.lt/informatics\\_in\\_education/](http://www.mii.lt/informatics_in_education/): member of editorial board, reviewer. ISSN 1648-5831
  5. Scientific journal “International Journal of Online Pedagogy and Course Design” (IJOPCD, USA). [www.igi-global.com/IJOPCD](http://www.igi-global.com/IJOPCD) : reviewer. ISSN 2155-6873
  6. Scientific journal “Journal of Studies in Education” (JSE, Macrothink Institute, USA). <http://www.macrothink.org/journal/index.php/jse/index> : reviewer. ISSN 2162-6952
  7. Scientific journal “Educational Research and Reviews” (ERR, Academic Journals). <http://www.academicjournals.org/err2/> : reviewer. ISSN 1990-3839
  8. Scientific journal “International Journal of Library and Information Science” (IJLIS, Academic Journals). <http://www.academicjournals.org/IJLIS/> : reviewer. ISSN 2141-2537
  9. Scientific journal “Information Technology Research Journal” (ITRJ, International Research Journals). <http://resjournals.com/ITJ/Index.htm> : reviewer
  10. Scientific journal “International Research Journal of Engineering Science, Technology and Innovation” (IRJESTI, International Research Journals).<http://www.interestjournals.org/IRJESTI>: reviewer
  11. Scientific journal “Journal of Information Technology and Application in Education” (JITAE, World Academic Publishing Inc.). <http://www.jitae.org/> : reviewer. ISSN 2227-6459
  12. Scientific journal “Organizacija” (Journal of Management, Informatics and Human Resources, University of Maribor, Slovenia). <http://versita.com/o/> : reviewer. ISSN 1318-5454 (print); ISSN 1581-1832 (online)
  13. Scientific journal “Vocational Education: Research and Reality” (Vytautas Magnus University, Lithuania). <http://biblioteka.vdu.lt/?q=ml-prtr.htm> : reviewer. ISSN 1392-6241
  14. Scientific journal “Journal of Education and Learning” (JEL, Canadian Center of Science and Education). <http://www.ccsenet.org/journal/index.php/jel/index> : reviewer. ISSN 1927-5250 (print); ISSN 1927-5269 (online)
- (1) Member of editorial boards and reviewer in scientific books:

15. IGI Global, USA – the book “Innovations in XML Applications and Metadata Management: Advancing Technologies”: member of editorial advisory board, reviewer.
16. IGI Global, USA – the book “E-Infrastructures and Technologies for Lifelong Learning: Next Generation Environments”: reviewer. ISBN 978-1-61520-983-5 (hardcover); ISBN 978-1-61520-984-2 (e-book)  
(2) Member of programme committees and the reviewer in ISI Web of Science conferences:
17. The annual European Conference on e-Learning (ECEL, UK) [abstracted / referenced in Thomson ISI Web of Science, ISTP, ERIC]. <http://www.academic-conferences.org/ecel/ecel-home.htm> : member of programme committee, chair of mini-track, reviewer
18. The annual International Conference on Creative Content Technologies (CONTENT, USA) [abstracted / referenced in Thomson ISI Web of Science, IEEE, INSPEC, ISTP]. <http://www.iaia.org/conferences2010/CONTENT10.html> : member of programme committee, reviewer
19. The annual International Conference on Networking and Services (ICNS, USA) [abstracted / referenced in Thomson ISI Web of Science, IEEE, INSPEC, ISTP]. <http://www.iaia.org/conferences2010/ICNS10.html> International Workshop on Learning Methodologies and Platforms used in the Cisco Networking Academy (LMPCNA) <http://www.iaia.org/conferences2010/LMPCNA.html> : member of programme committee, reviewer
20. The annual International Conference on Software Engineering Advances (ICSEA, USA) [abstracted / referenced in Thomson ISI Web of Science, IEEE, INSPEC, ISTP]. <http://www.iaia.org/conferences2010/ICSEA10.html> : member of programme committee, reviewer

#### **T. Jevsikova**

- Junior member of International Federation for Information Processing (IFIP) TC 3 WG 3.1 (Informatics and ICT in Secondary Education)
- Member of Commission of the terms of informatics and information technologies
- Reviewer of Doctoral Dissertation „Extended metadata model for digital learning resources“ (author: Svetlana Kubilinskienė, defended 2012-03-07).
- Reviewer and a member of defence committee of Doctoral Dissertation „Skaitmeninės knygos kokybė vartotojo požiūriu“ (author: Arūnas Gudiničius, scheduled defence: 2012-12-18).
- 3rd international doctoral consortium on informatics engineering education research: methodologies, methods, and practice, December 3-7, 2012, Druskininkai: member of organizing committee.
- Scientific journal “Informatics in Education” (Vilnius University, Lithuania). [http://www.mii.lt/informatics\\_in\\_education/](http://www.mii.lt/informatics_in_education/): reviewer. ISSN 1648-5831

#### **I. Žilinskienė**

- 3rd international doctoral consortium on informatics engineering education research: methodologies, methods, and practice, December 3-7, 2012, Druskininkai: member of organizing committee.

## 5.2. NUMERICAL ANALYSIS DEPARTMENT

Akademijos 4, LT-08663 Vilnius

Tel. (8~5) 2109 734

E-mail: [agnė.skucaite@mii.vu.lt](mailto:agnė.skucaite@mii.vu.lt)

www <http://www.mii.lt>

**Head** – Prof. Dr. (HP) Artūras Štikonas

**Principal researchers:**

1. Prof. Dr. Habil. Mifodijus Sapagovas
2. Prof. Dr. (HP) Stasys Rutkauskas
3. Prof. Dr. (HP) Artūras Štikonas

**Senior researchers:**

1. Doc. Dr. Olga Štikonienė

**Researchers:**

1. Dr. Svetlana Roman

**Affairs manager:**

1. Agnė Skučaitė

**Doctoral students:**

- |                           |                              |
|---------------------------|------------------------------|
| 1. Aidas Balčiūnas        | 5. Igor Saburov              |
| 2. Justina Jachimavičienė | 6. Agnė Skučaitė             |
| 3. Mažvydas Mackevičius   | 7. Kristina Skučaitė-Bingelė |
| 4. Santa Račkauskienė     | 8. Liana Stonkienė           |

### ***RESEARCH INTERESTS***

Differential equations and applications. Investigation of the spectrum and boundary value problems for differential and difference operators with nonlocal conditions.

### ***RESEARCH PROJECTS CARRIED OUT IN 2012***

#### **Projects Supported by University Budget**

The stability of three-layered difference schemes for parabolic equation with nonlocal integral conditions was investigated, the dependence of the spectrum of the difference operator on the parameters occurring in the nonlocal condition was analysed.

The properties of Green's function were investigated for an  $m$ th-order discrete problem with additional conditions.

The well-posedness of weighted boundary value problem to a system of ordinary differential equations with singularity was proposed. Both existence and uniqueness of the solution of this problem was considered.



## **Projects, Programmes, Issues Supported by Lithuanian State Science and Studies Foundation**

Project: *Multidimensional problems with nonlocal boundary condition: numerical methods and applications* (Mifodijus Sapagovas, Olga Štikonienė, Svetlana Roman, Kristina Jakubėlienė), 2011-2012

## **Governmental Science Programmes and Research Projects Ordered by the Branch Ministries**

### **COOPERATION**

Belarus State University (Minsk, Belarus)

### **OTHER SCIENTIFIC ACTIVITIES**

#### **Prof. A. Štikonas**

- Editorial board member of the “*Lithuanian Mathematical Journal*”
- Executive Editor “*Mathematical Modelling and Analysis*”
- Deputy-Editor-in-Chief of the journal “*Nonlinear Analysis: Modelling and Control*”
- Member of organizing committee MMA-2012 (International Conference on Mathematical Modelling and Analysis, Tallinn, Estonia)

#### **Prof. M. Sapagovas –**

- Editor-in-Chief of journal “*Lithuanian mathematical journal*”
- Editorial board member of journal “*Nonlinear Analysis: Modelling and Control*”

#### **Doc. Dr. O. Štikonienė –**

- Editor Secretary of journal “*Lithuanian mathematical journal*”

#### **Prof. S. Rutkauskas –**

- Editorial board member of journal “*Lithuanian mathematical journal*”
- Editorial board member of journal “*Mathematical Modelling and Analysis*”

## **5.3. PROBABILITY THEORY AND STATISTICS DEPARTMENT**

Akademijos 4, LT-08663 Vilnius

Tel. +370 2109 731

E-mail: [kestutis.kubilius@mii.vu.lt](mailto:kestutis.kubilius@mii.vu.lt)

**Head** – Prof. Habil. Dr. Kęstutis Kubilius

#### **Principal researchers:**

1. Prof. Habil. Dr. Kęstutis Kubilius,
2. Prof. Habil. Dr. Eugenijus Manstavičius,
3. Prof. Dr. (HP) Saulius Norvidas,
4. Prof. Habil. Dr. Vygantas Paulauskas,
5. Prof. Habil. Dr. Rimantas Rudzkis,
6. Prof. Habil. Dr. Jonas Kazys Sunklodas.

#### **Senior researchers:**

1. Prof. Dr. (HP) Olga Januškevičienė,
2. Assoc. Prof. Dr. Danutė Krapavickaitė,

3. Assoc. Prof. Dr. Aleksandras Plikusas,
4. Assoc. Prof. Dr. (HP) Marijus Radavičius.

**Affiliated principal researcher:**

1. Dr. (HP) Juozas Juvencijus Mačys.

**Researchers:**

1. Andrius Čiginas.

**Scientist trainee:**

1. Dr. Aleksej Bakšajev.

**Specialist:**

1. Dainius Dzindzalieta,
2. Paulius Šarka.

**Affairs manager:**

1. Rimantė Baltutytė.

**Doctoral students:**

1. Dainius Dzindzalieta,
2. Karolina Piaseckienė,
3. Tomas Rudys.

***RESEARCH INTERESTS***

Applied probability theory, statistical hypothesis testing, econometrics.

Probability theory, random matrix theory, combinatorics, discrete mathematics

Exponential dispersion models.

Finite population statistics and statistical analysis of data.

Extremal Problems in Harmonic Analysis.

Statistics of random process

***RESEARCH PROJECTS CARRIED OUT IN 2012***

***Projects Supported by University Budget***

**Statistical Properties of Complex Random Systems.** Prof. V. Bentkus (until June 03, 2010), Prof. J. K. Sunklodas, Prof.M. Radavičius (since June 03, 2010). 2010–2012.

The new representations for Tweedie EDMs as well as several new concepts and technical assertions were investigated. The general asymptotic formula for the probabilities of high excursions of differentiable Gaussian fields was proved. The optimal estimates of smooth metrics in the central limit theorem have been obtained for random sums of independent nonidentically distributed random variables. The problem of estimation of the tail index in the case where max-aggregated random variables are observed. A strongly consistent and asymptotic normal estimators of the Hurst index of stochastic differential equation driven by a fractional Brownian motion is proposed. A total variation approximation for the distribution of component vector of a weakly logarithmic random assembly is obtained. Necessary and sufficient conditions for a generalized function to be a positive definite distribution were

investigated. For sparse contingency tables, nonparametric tests have been constructed and their consistency in the general setting of sparse asymptotics have been proved. Statistical properties of finite-population statistics were considered.

### ***Governmental Science Programmes and Research Projects Ordered by the Branch Ministries***

#### **Dr. A. Bakšajev**

Project. "Probabilities of high excursions of Gaussian fields". (postdoc Dr. A. Bakshaev, supervisor Prof. Habil. Dr. R. Rudzkiš). The research is supported by the European Union Structural Funds project 'Postdoctoral Fellowship Implementation in Lithuania' within the framework of the Measure for Enhancing Mobility of Scholars and Other Researchers and the Promotion of Student Research (VP1-3.1-LMM- 01) of the Program of Human Resources Development Action Plan.

#### **COOPERATION**

- Bielefeld university Collaborative Research Centre „Spectral Structures and Topological Methods in Mathematics”, Germany.
- Institute for mathematics and applications of University of Minnesota, USA.
- Ohio University (USA)
- University of Southern Denmark
- School of Computing, Engineering and Applied Mathematics, University of Abertay Dundee, UK
- Participation in the steering committee and organization of the activities of the Baltic-Nordic-Ukrainian network on survey statistics  
<https://wiki.helsinki.fi/display/BNU/Organisation>

#### **OTHER SCIENTIFIC ACTIVITIES**

##### **Assoc. Prof. Dr. D. Krapavickaitė**

- Editor in Chief of the journal „Lietuvos statistikos darbai” 2012.
- [www.statisticsjournal.lt](http://www.statisticsjournal.lt)
- Member of the programme committee of the Workshop on Survey Sampling Theory and Methodology, August 2012, Valmiera, Latvia.
- Member of the programme committee of the Summer School on Survey Sampling Theory and Methodology, June 2013, Minsk, Belarus.

##### **Prof. K. Kubilius**

- managing editor of the *Lithuanian Mathematical Journal*,  
<http://www.springer.com/mathematics/journal/10986?detailsPage=editorialBoard>;
- editorial board member of the *Mathematical Modelling and Analysis*,  
<http://inga.vgtu.lt/~art/>.
- Member of Programme committee of international conference „Modern stochastics: theory and application III“ <http://probability.univ.kiev.ua/msta3conf/committees.php>.

##### **Prof. Habil. Dr. E. Manstavičius**

- Section Editor of the *Lithuanian Mathematical Journal*;  
<http://www.springer.com/mathematics/journal/10986?detailsPage=editorialBoard>
- Editorial board member of the *International Journal of Number Theory*;  
<http://www.worldscientific.com/page/ijnt/editorial-board>

- Editorial board member of the *ISRN Combinatorics*;  
<http://www.isrn.com/journals/combinatorics/editors/>
- Chairman of the Editorial Board of the *Lietuvos Matematikos Rinkiny. LMD Darbai*
- Co-editor of the Kubilius Memorial Volume “*Analytic and Probabilistic Number Theory*”, Vilnius, TEV, 2012.
- Independent expert of the mathematics/engineering panel of the EC FP7 M. Curie Programme.
- Chairman of the Board of the Lithuanian Mathematical Society.

**Prof. Dr. (HP) S. Norvidas**

- Editorial board member of the Lithuanian Mathematical Journal.
- Scientific supervisor of doctoral student D. Dzindzalieta.
- Referee of scientific journals: Mathematical Reviews, Zentralblatt MATH, Functional Analysis and Its Applications.

**Prof. Habil. Dr. V. Paulauskas**

- Section Editor of the Lithuanian Mathematical Journal.
- Section Editor and member of Advisory board of the Central European Mathematical Journal.
- Chairman of Section of mathematics in the Academy of Sciences of Lithuania.

**Assoc. Prof. M. Radavičius –**

- Scientific supervisor of doctoral students K. Piaseckienė and Agnė Reklaitė.

**Prof. Habil. Dr. R. Rudzkis**

- Editorial board member of the Lithuanian Mathematical Journal,
- Editorial board member of the journal “Прикладная эконометрика”.
- Editorial board member of the journal „Lietuvos statistikos darbai”.
- Editorial board member of the journal “Pinigų studijos”.
- The supervisor of the Postdoc student Aleksej Bakshaev according to the project Postdoctoral Fellowship Implementation in Lithuania (VP1-3.1-ŁMM-01).

## 5.4. RECOGNITION PROCESSES DEPARTMENT

Akademijos 4, LT-08663 Vilnius

Tel. +370 210 9732

E-mail: [info@mii.vu.lt](mailto:info@mii.vu.lt)

**Head** – Prof. Dr. (HP) *Julius Žilinskas*

**Principal researchers:**

1. Prof. Dr. (HP) Julius Žilinskas
2. Prof. habil. Dr. Kazys Kazlauskas

**Senior researchers:**

1. Prof. habil. Dr. Laimutis Telksnys
2. Assoc. Prof. Dr. Rimantas Pupeikis

**Researchers:**

1. Dr. Gintautas Tamulevičius
2. Nerijus Galiauskas
3. Algirdas Lančinskas

**Postdoctoral researcher:**

1. Dr. Remigijus Paulavičius

**Specialists and engineering staff:**

1. Deividas Eringis
2. Jonas Kaukėnas
3. Linas Makutėnas
4. Evaldas Robertas Ožeraitis
5. Kamil Ząbkiewicz

**Affairs manager:**

1. Joana Katina

**Doctoral students:**

1. Gžegož Bedulskij
2. Agnė Dzidolikaite
3. Deividas Eringis
4. Nerijus Galiauskas
5. Algirdas Lančinskas
6. Tatjana Liogienė
7. Robertas Mažeika
8. Vladislov Panevski
9. Gražina Pyž

***RESEARCH INTERESTS***

Random processes analysis and recognition.

***RESEARCH PROJECTS CARRIED OUT IN 2012*****Projects Supported by University Budget**

Project title: „Recognition system synthesis for signals with complex structure“.

Main results:

1. Problems of identification of parameter values in nonlinear regression have been analyzed, requirements for optimization algorithms have been foreseen.
2. Accuracy estimation of detection of extrasystoles in heart rate sequences.
3. A forward-backward basis function approach for instantaneous frequency estimation of the frequency modulated signal in noisy environment was presented.
4. Increasing of efficiency of self-tuning minimum variance control of linear dynamical systems followed by saturation nonlinearities in a noisy frame.
5. The issue of speech segmentation is surveyed and analyzed. Variation of fundamental frequency and formant values are selected as the basis for ambiguous segmentation of speech signals. The purpose of ambiguous segmentation is to create acoustically based speech segmentation algorithm without any predefined grammatical background.

**Projects, Programmes, Issues Supported by Lithuanian State Science and Studies Foundation**

1. Reimbursement of expenses related to participation at the meetings of European Science Foundation (ESF) Standing Committee for Physical and Engineering Sciences (PESC). No. ADS-03/2012/ LSS-580000-322. Leader Prof. Dr. (HP) J. Žilinskas. 2011-2012.
2. European Union Structural Funds project "Postdoctoral Fellowship Implementation in Lithuania" within the framework of the Measure for Enhancing Mobility of Scholars and Other Researchers and the Promotion of Student Research (VP1-3.1-ŠMM-01) of

the Program of Human Resources Development Action Plan. Post doctoral researcher R. Paulavičius. No. 004/18/ MTDS-580000-400. Supervisor Prof. Dr. (HP) J. Žilinskas. 2012-2014.

### **International Science Programmes and Projects**

1. COST action „Open European Network for High Performance Computing on Complex Environments“ IC0805. Member of managing Committee Prof. Dr. (HP) J. Žilinskas. 2009-2013.

### **COOPERATION**

- Lithuanian University of Educational Sciences (Lithuania)
- Kaunas University of Technology, Faculty of Telecommunications and Electronics (Lithuania)
- Vilnius Gediminas Technical University, Faculty of Civil Engineering (Lithuania)
- Vilnius Gediminas Technical University, Faculty of Electronics (Lithuania)
- Vilnius Gediminas Technical University, Faculty of Fundamental Sciences (Lithuania)
- Šiauliai University, Faculty of Social Welfare and Disability Studies (Lithuania)
- Hospital Kauno klinikos of Lithuanian University of Health Sciences (Lithuania)
- UAB “Algoritmu sistemos” (Lithuania)
- UAB “Inogama” (Lithuania)
- UAB “Mediaskopas” (Lithuania)
- University of Almeria (Spain)

### **OTHER SCIENTIFIC ACTIVITIES**

#### **Prof. Dr. (HP) J. Žilinskas**

- member of editorial boards of international journals:
  - Central European Journal of *Computer Science* (Springer/Versita), <http://versita.net/cejcs/editors/>
  - Central European Journal of *Engineering* (Springer/Versita), <http://versita.net/ceje/editors/>
  - *Informatica* (IOSPress/VU), <http://www.mii.lt/informatica/editors.htm>
  - *Journal of Global Optimization* (Springer), <http://www.springer.com/business+%26+management/operations+research/journal/10898?detailsPage=editorialBoard>
  - *Mathematical Modelling and Analysis* (Taylor&Francis/VGTU), <http://www.tandf.co.uk/journals/journal.asp?issn=1392-6292&linktype=145>
  - *Optimization Letters* (Springer), <http://www.springer.com/mathematics/journal/11590?detailsPage=editorialBoard>
- nominated expert of Lithuania at COST domain Information and Communication Technologies, <http://w3.cost.esf.org/index.php?id=31>
- member of management committee of COST action "Open European Network for High Performance Computing on Complex Environments", [http://w3.cost.esf.org/index.php?id=177&action\\_number=IC0805](http://w3.cost.esf.org/index.php?id=177&action_number=IC0805)
- member of managing board of Continuous Optimization Working Group of The Association of European Operational Research Societies (EURO), [http://www.iam.metu.edu.tr/EUROPT/h\\_contactyeni.html](http://www.iam.metu.edu.tr/EUROPT/h_contactyeni.html)

- member of board of Lithuanian Operational Research Society (member society of EURO and IFORS), head of working group Optimization Methods and Applications, <http://www.mii.lt/LitORS/>
- member of the ESF Standing Committee for Physical and Engineering Sciences, <http://www.esf.org/research-areas/physical-and-engineering-sciences/about/standing-committee/membership-of-the-esf-standing-committee-for-physical-and-engineering-sciences-pesc.html>
- Organizer of Minisymposium Applications of Parallel Computation in Industry and Engineering at PARA 2012: Workshop on State-of-the-Art in Scientific and Parallel Computing, Helsinki, Finland, June 10-13, 2012, <http://www.techmat.vgtu.lt/para2012/>
- Co-chair of Program Committee of 10th EUROPT Workshop on Advances in Continuous Optimization (EUROPT-2012), Šiauliai, Lithuania, July 5-7, 2012, <http://www.mii.lt/europt-2012/index.php?page,organization.en>

**Prof. Habil. Dr. A. L. Telksnys**

- member of Council on Digitization of Lithuanian Cultural Heritage;
- member of the IEEE Technical Committee on eHealth;
- member of the Working group WG 7.1 Modeling and Simulation of the International Federation of Information Processing (IFIP),
- member of Lithuanian Academy of Sciences;
- member of Commission of the Seimas of the Republic of Lithuania on Lithuanian traditions and heritage actualization;
- editorial board member of the international journal Informatica, <http://www.mii.lt/Informatica/editors.htm>;
- editorial board member of the international journal Information Technology and Control, <http://www.itc.ktu.lt/index.php/ITC/about/editorialTeam>;
- editorial board member of the journal Informacijos mokslai, <http://www.leidykla.vu.lt/lt/mokslo-darbai/informacijos-mokslai/informacijos-mokslai-2011-55-tomas/redaktoriu-kolegija/>;
- editorial board member of the international journal Electronics and Electrical Engineering;
- editorial board member of the international journal Tamkang Journal of Science and Engineering, [http://www2.tku.edu.tw/~tkjse/editorial\\_board-en.htm](http://www2.tku.edu.tw/~tkjse/editorial_board-en.htm).

**Prof. Habil. Dr. K. Kazlauskas**

- member of Lithuanian Computer Society, <http://www.liks.lt>;
- member of Lithuanian Mathematical Society, <http://www.mif.vu.lt/lmd/>;
- member of Lithuanian Scientific Society, <http://www.lms.lt/?q=en/members>.

**Assoc. Prof. Dr. R. Pupeikis**

- reviewer for the international journal Informatica, <http://www.mii.lt/Informatica/>;
- member of Lithuanian Computer Society, <http://www.liks.lt>;
- member of Lithuanian Mathematical Society, <http://www.mif.vu.lt/lmd/>;
- member of Lithuanian Scientific Society, <http://www.lms.lt/?q=en/members>.

## 5.5. SYSTEMS ANALYSIS DEPARTMENT

Akademijos 4, LT-08663 Vilnius

Tel. +370 210 9732

E-mail: [info@mii.vu.lt](mailto:info@mii.vu.lt)

**Head** – Prof. Habil. Dr. *Gintautas Dzemyda*

### **Principal researchers:**

1. Prof. Habil. Dr. Gintautas Dzemyda
2. Prof. Habil. Dr. Jonas Mockus
3. Prof. Habil. Dr. Leonidas Sakalauskas
4. Prof. Habil. Dr. Antanas Žilinskas

### **Senior researchers:**

1. Assoc. Prof. Dr. Olga Kurasova
2. Assoc. Prof. Dr. Saulius Minkevičius
3. Dr. Audronė Jakaitienė
4. Dr. Virginijus Marcinkevičius

### **Affiliated researchers:**

1. Prof. Habil. Dr. Algis Garliauskas
2. Prof. Dr. Algirdas Pakštas
3. Dr. Audris Mockus

### **Researchers:**

1. Assoc. Prof. Dr. Igor Belov
2. Dr. Vaida Bartkutė-Norkūnienė
3. Dr. Jolita Bernatavičienė
4. Dr. Rasa Karbauskaitė
5. Dr. Viktor Medvedev
6. Dr. Jurgis Sušinskas
7. Dr. Povilas Treigys
8. Vytautas Jančiauskas

**Postdoctoral researcher:** *Dr. Juozas Gordevičius*

### **Specialists and engineering staff:**

1. Gintautas Jakimauskas
2. Karolis Koncevičius
3. Laimutė Mikalauskiene
4. Laura Ringienė
5. Vytautas Tiešis
6. Karolis Urbanavičius

**Affairs manager:** *Joana Katina*

### **Doctoral students:**

1. Edgaras Artemčiukas
2. Gediminas Balkys
3. Darius Baronas
4. Gediminas Bazilevičius
5. Valerijonas Dumskis
6. Vytautas Jančiauskas
7. Liudas Kaklauskas
8. Igor Katin
9. Joana Katina
10. Ramūnas Kraujutis
11. Jurij Kuznecov
12. Mindaugas liogys
13. Karolis Mikėnas
14. Olegas Niakšu
15. Kotryna Paulauskienė
16. Julija Pragarauskaitė
17. Tomas Pranckevičius
18. Saulius Preidys
19. Aurimas Rapečka
20. Laura Ringienė
21. Tadas Ringys
22. Martynas Sabaliauskas
23. Loreta Savulionienė
24. Justas Stašionis
25. Pavel Stefanovič
26. Ingrida Vaičiulytė
27. Gintaras Vaira
28. Irina Vinogradova



## ***RESEARCH INTERESTS***

Medical data analysis and decision support; Analysis of large data sets; Data mining; Visualisation of multidimensional data; Multiple criteria decision support; Artificial neural networks; Parallel computing; Global optimization methods; Local optimization methods; WEB service development; Internet data mining; Creation and computational realization of complex simulation models in epidemiology, education and energy supply systems and of various other origin with uncertainty; Optimal control applications; Image analysis, feature detection, image reconstruction, medical image processing; Epigenetic DNA alteration detection, epigenetic markers analysis; Development of decision support systems; Monte-Carlo method; Stochastic Programming; Queueing Theory; Operations Research.

## ***RESEARCH PROJECTS CARRIED OUT IN 2012***

### **Projects Supported by University Budget**

Project title: „Decisions in optimization, modeling and visualization problems“.

Main results:

1. Algorithms for multidimensional data visualization, based on self-organizing maps, are developed.
2. An approach is proposed for the analysis of the online shopping data by integrating multidimensional data visualization methods of different nature.
3. The local binarization method is modified for automatic detection of blood vessels in retinal images.
4. The Pareto-Lipschitzian algorithm is developed and investigated.
5. An algorithm is proposed for the uniform representation of the Pareto set of a multi-objective optimization problem.
6. It is proved inequality in multiserver open queueing networks for queue length of jobs and virtual waiting time of job in heavy traffic conditions.
7. Approximation of the Transmission Disequilibrium Test using Poisson distribution for family based data is developed.
8. Comparative analysis of classification methods (C.4.5, kNN, SVM, Naïve Bayes) is accomplished in order to identify most accurate method for data of patients.
9. Limit theorems for coefficients of a modified Borwein method are proved, and parallel version the algorithm for the calculation of the Riemann zeta-function is implemented and scrutinized on the IBM-SP6 cluster.
10. The Risk Aversion problem, often arising in credit and portfolio applications, has considered as a framework of nonlinear stochastic programming with constraints on CVAR of financial instruments. The method of sequential quadratic programming is developed to solve the risk aversion optimization problem by series of Monte-Carlo estimators. The approach considered distinguishes by adaptive regulation of the Monte-Carlo sample size, which ensures convergence with linear rate, and statistical manner for termination of the algorithm.
11. The numerical issues of empirical Bayesian (EB) approach model, applied to estimation of small rates have been considered. The properties of EB model have been investigated and compared by Monte-Carlo method. The approach developed has been tested with real statistical data of Lithuanian population.

### **Projects, Programmes, Issues Supported by the Research Council of Lithuania**

1. The research project „Methods and algorithms of non-convex multi-objective optimization“. No. MIP-063/2012/ LSS-580000-444. Leader Prof. Habil. Dr. A. Žilinskas. 2012-2014.
2. Support to organize „25th European Conference on Operational Research (EURO XXV 2012)“. No. MOR-035/2012/ LSS-580000-1150. Leader Prof. Habil. Dr. L. Sakalauskas. 2012.
3. European Union Structural Funds project "Postdoctoral Fellowship Implementation in Lithuania" within the framework of the Measure for Enhancing Mobility of Scholars and Other Researchers and the Promotion of Student Research (VP1-3.1-ŠMM-01) of the Program of Human Resources Development Action Plan. Post doctoral researcher J. Gordevičius. No. 004/11/ MTDS-580000-401. Supervisor Prof. Habil. Dr. G. Dzemyda. 2012-2014.
4. Stimulation of student scientific activity. No. SMP016, SMP0211. Leader Assoc. Prof. Dr. S. Minkevičius. 2012.

### **Governmental Science Programmes and Research Projects Ordered by the Branch Ministries**

1. „Theoretical and engineering aspects of development and application of the Internet technologies in the effective computing platforms“. Project of the National Integrated Program of Information Technologies No. VP1-3.1-ŠMM-08-K-01-010. Leader Prof. Habil. Dr. G. Dzemyda. 2012-2015.
2. High technology development programmes for 2011-2013 research and experimental development project „Methods and software for modeling and visualization of business processes. PROMOS“. No. 31V-145. Leader Prof. Habil. Dr. A. Žilinskas. 2011-2013.
3. Innovation voucher from LLC “Algoritmų sistemos“. Title – Optimization and implementation of artificial neural networks. No. 31V-109. Supported by Agency for Science, Innovation and Technology. Leader Assoc. Prof. Dr. O. Kurasova. 2012.
4. “Creation of the website providing integral resources, products and services of the Lithuanian language and its writing” Project of EU Structural funds economic growth action program’s priority “Information Society for All” implementation tool “Lithuanian language in the information society”. No. VP2-3.1-IVPK-12-K-01-003/ LSS-580000-2197. Leader Dr. V. Marcinkevičius. 2012-2015.
5. Joint Activity Agreement No. BS-580000-1892 with UAB „Algoritmų sistemos“ for the eMentorius project. 2011-2012.

### **International Science Programmes and Projects**

1. “Eurostars” joint programme project “Production effectiveness navigator”. No. pen!6232 PEN implementation. No. 31V-27/LSS-580000-407, („Eurostars“ programme). Leader Prof. Habil. Dr. G. Dzemyda. 2011-2014.
2. COST action „Combining Soft Computing Techniques and Statistical Methods to Improve Data Analysis Solutions“. Contract No. IC0702. Leader Assoc. Prof. Dr. O. Kurasova. 2008-2012.

### **COOPERATION**

- Lithuanian University of Educational Sciences, Vilnius, Lithuania
- Vilnius Gediminas Technical University, Vilnius, Lithuania
- Kaunas University of Technology, Kaunas, Lithuania

- Vytautas Magnus University, Kaunas, Lithuania
- Šiauliai University, Šiauliai, Lithuania
- Klaipeda University, Klaipeda, Lithuania
- Mykolas Romeris University, Vilnius, Lithuania
- University College London, UK
- Poznan Supercomputing and Networking Center, Poland
- Middle East Technical University, Ankara, Turkey
- University Federal Rio de Janeiro, Brasil

### ***OTHER SCIENTIFIC ACTIVITIES***

#### **Prof. Habil. Dr. G. Dzemyda**

- member of the Lithuanian Academy of Sciences  
[http://lma.lt/index.php?option=com\\_k2&view=item&layout=item&id=235&Itemid=243&lang=lt](http://lma.lt/index.php?option=com_k2&view=item&layout=item&id=235&Itemid=243&lang=lt)
- editorial board member of the International Journal *Informatica* (IOSPress/VU), executive editor, <http://www.mii.lt/Informatica/editors.htm>
- editorial board member of Eastern and Central Europe Journal *Informatics in Education*, [http://www.mii.lt/informatics\\_in\\_education/editors.htm](http://www.mii.lt/informatics_in_education/editors.htm)
- editorial board member of the International Journal *Scientific Proceedings of Riga Technical University. Computer Science. Information Technology and Management Science*, <http://www.rtu.lv/en/content/view/3817/2100/lang,en/#5>
- editorial board member of the *Journal of Civil Engineering and Management*, [http://www.jcem.vgtu.lt/en/?page=2&sub=RED\\_KOLEGIJA](http://www.jcem.vgtu.lt/en/?page=2&sub=RED_KOLEGIJA)
- editorial board member of the *Nonlinear Analysis; Modelling and Control*, deputy-editor-in-chief, <http://www.mii.lt/NA/>
- member of Lithuanian Computer Society, <http://www.liks.lt/>
- member of Lithuanian Mathematical Society, <http://www.mif.vu.lt/lmd/>
- member of Lithuanian Operational Research Society, <http://www.mii.lt/LitORS/>
- member of IFIP Technical Committee 12 Artificial Intelligence, <http://www.ifiptc12.org.uk/ifiptc12/members.php>
- general chair of the 10th International Baltic Conference on Databases and Information Systems (Baltic DB&IS 2012), Vilnius, Lithuania, July 8-11, 2012
- member of programme committees of the following International conferences:
  - 4rd International Seminar „Data Analysis Methods for Software Systems“, Druskininkai, Lithuania, December 6-8, 2012.
  - 1st International Conference on Operations Research and Enterprise Systems (ICORES), Vilamoura, Algarve, Portugal, February 4-6, 2012

#### **Prof. Habil. Dr. L. Sakalauskas**

- editorial board member of Journal *Technological and Economic Development of Economy* <http://www.tandf.co.uk/journals/journal.asp?issn=2029-4913&linktype=145>
- elected member of International Statistical Institute (2001) <http://isi-web.org/>
- member of European Working Group on Continuous Optimization <http://www.iam.metu.edu.tr/EUROPT/>
- President of Lithuanian Operational Research Society, <http://www.mii.lt/LitORS/>
- Chair of the Organising Committee of XXV EURO Conference <http://www.euro-2012.lt>

- member of Programme Committee of Workshop "Stochastic Programming for Implementation and Advanced Applications" (<http://www.mii.lt/stoprog-2012>)
- member of Programming Committee of Workshop "Advances in Continuous Optimization" (<http://www.mii.lt/europt-2012>)

**Prof. Habil. Dr. A. Žilinskas**

- member of the Lithuanian Academy of Sciences  
[http://lma.lt/index.php?option=com\\_k2&view=item&layout=item&id=235&Itemid=243&lang=lt](http://lma.lt/index.php?option=com_k2&view=item&layout=item&id=235&Itemid=243&lang=lt)
- member of editorial boards of international journals:
  - *Journal of Global Optimization* (Springer),  
<http://www.springer.com/business+%26+management/operations+research/journal/10898?detailsPage=editorialBoard>
  - *Control and Cybernetics*, <http://control.ibspan.waw.pl:3000/mainpage/index>
  - *Informatica* (IOSPress/VU), <http://www.mii.lt/Informatica/editors.htm>
  - *Journal of Intelligent Learning Systems and Applications*,  
<http://www.scirp.org/journal/jilsa/>
  - *International Journal of Grid and High Performance Computing*, <http://www.igi-global.com/Bookstore/TitleDetails.aspx?TitleId=1105&DetailsType=ReviewBoard>
  - *The Open Cybernetics and Systemics Journal*,  
<http://www.bentham.org/open/tocsj/EBM.htm>
- expert of EU Eurostars
- expert of Agency for Science, Innovation and Technology
- member of IFIP working group WG 7.6 Optimization-Based Computer Aided Modeling and Design, <http://www.ifip.org/bulletin/bulltcs/memtc07.htm>
- member of American Mathematical Society <http://www.ams.org/cml>
- member of programme committees of the following International conferences:
  - CompSysTech 12, Ruse, Bulgaria, 22-23 June, 2012.
  - 18th International Conference, Information and Software Technology, Kaunas, September 13-14, 2012.
  - Workshop on computational optimization, Wroclaw, Poland, September 9-12, 2012.
  - The 7th International Conference on Neural Networks and Artificial Intelligence, Minsk, Belarus October 10-12, 2012.
  - International workshop STOPROG-2012, Neringa, July 3-6, 2012.

**Prof. Habil. Dr. J. Mockus**

- member of the Lithuanian Academy of Sciences  
[http://lma.lt/index.php?option=com\\_k2&view=item&layout=item&id=235&Itemid=243&lang=lt](http://lma.lt/index.php?option=com_k2&view=item&layout=item&id=235&Itemid=243&lang=lt)
- editor-in-chief of International Journal *Informatica* (IOSPress/VU),  
<http://www.mii.lt/Informatica/editors.htm>
- member of editorial board of International Journal *Journal of Global Optimization* (Springer),  
<http://www.springer.com/business+%26+management/operations+research/journal/10898?detailsPage=editorialBoard>
- member of American Mathematical Society <http://www.ams.org/cml>
- member of IFIP Technical Committee WG 7.7 Stochastic Optimization,  
<http://www.ifip.org/bulletin/bulltcs/memtc07.htm>

### **Habil. Dr. A. Garliauskas**

- referee of international journals:
  - *Informatica* (IOSPress/VU)
  - *IEEE Transactions on Neural Networks*
- member of Lithuanian Science Society Council, <http://www.lms.lt/>
- chair person of Informatics Department of Lithuanian Science Society, <http://lms.lt/?q=en/society/browse/22>
- member of Intelligent Systems Research Laboratory at the College of Engineering, <http://www.engr.usask.ca/>
- member of Special Interest Group on Nonlinear Dynamics (SIG/NL), <http://www.acm.org/sigs>
- member of Neuroscience Special Interest Group (SIG), <http://www.inns.org/sig/>
- member of ABI research advisory board, <http://www.abiworldwide.com/>

### **Assoc. Prof. Dr. O. Kurasova**

- reviewer of international journals:
  - *Informatica* (IOSPress/VU)
  - *Mathematical Modelling and Analysis* (Taylor & Francis)
  - *Journal of Visualization* (Springer)
  - *Mechanical Systems and Signal Processing* (Elsevier)
  - *Informatics in Education* (VU)
- member of Lithuanian Computer Society (Artificial Intelligence Section), <http://www.liks.lt/>
- member of Lithuanian Mathematical Society, <http://www.mif.vu.lt/lmd/>
- member of Lithuanian Operational Research Society, <http://www.mii.lt/LitORS/>
- member of management committee of COST action „Combining Soft Computing Techniques and Statistical Methods to Improve Data Analysis Solutions“, [http://w3.cost.eu/index.php?id=110&action\\_number=IC0702](http://w3.cost.eu/index.php?id=110&action_number=IC0702)

### **Dr. A. Jakaitienė**

- referee of the international journals:
  - *Journal of Global Optimization* (Springer)
  - *Optimization Letters* (Springer)
  - *Lithuanian Mathematical Journal* (Springer)
- member of Lithuanian Mathematical Society, <http://www.mif.vu.lt/lmd/>
- member of Lithuanian Statistics Society, [http://www.statistikusajunga.lt/index.php?option=com\\_content&task=view&id=10&Itemid=12](http://www.statistikusajunga.lt/index.php?option=com_content&task=view&id=10&Itemid=12)

### **Assoc. Prof. Dr. I. Belovas**

- reviewer of international journal *Mathematical Modelling and Analysis* (Taylor & Francis)
- member of *Lithuanian Mathematical Society*, <http://www.mif.vu.lt/lmd/>

### **V. Tiešis**

- reviewer of international journals:
  - *Journal of Global Optimization* (Springer)
  - *Informatica* (IOSPress/VU)
- member of Lithuanian Mathematical Society, <http://www.mif.vu.lt/lmd/>

## 5.6. SOFTWARE ENGINEERING DEPARTMENT

Akademijos 4, LT-08663 Vilnius  
Tel. (+370 5) 2109 340, fax (+370 5) 2729209  
E-mail: [albertas.caplinskas@mii.vu.lt](mailto:albertas.caplinskas@mii.vu.lt)  
WWW: <http://www.mii.lt/PSIS/indexEN.php>

**Head** – Prof. Dr. *Albertas Čaplinskas*

**Head of Mathematical Logic Sector at Software Engineering Department** – Assoc. Prof. Habil. Dr. *Regimantas Ričardas Pliuškevičius* (e-mail: [Regimantas.Pluskevicius@mii.vu.lt](mailto:Regimantas.Pluskevicius@mii.vu.lt))

### *STAFF*

**Chief research fellows:** Prof. Dr. A. Čaplinskas, Prof. Dr. D. Dzemydienė (part-time).

**Senior research fellow:** Assoc. Prof. Dr. A. Lupeikienė.

**Research fellows:** Dr. S. Maskeliūnas, Dr. V. Paliulionis (till 31 October).

**Assistant research fellow:** L. Paliulionienė.

**Engineer programmer:** J. Miliauskaitė (part-time).

**Doctoral students:** D. Drungilas, R. Dzindzalieta, G. Gričius, M. Kurmis, J. Miliauskaitė, A. Miliauskas, S. Svanidzaitė, M. Šaučiūnas (till 30 September).

### *Sector of Mathematical Logic*

**Senior research fellow:** Assoc. Prof. Habil. Dr. R. Pliuškevičius.

**Research fellows:** Dr. R. Alonderis, Assoc. Prof. Dr. J. Sakalauskaitė.

**Doctoral students:** H. Giedra, A. Girčys.

**Affiliated principal researcher:** Prof. Habil. Dr. S. Jukna.

**Affiliated senior researcher:** Assoc. Prof. Dr. A. Pliuškevičienė.

### *RESEARCH INTERESTS*

Software engineering  
Information system engineering  
Software service engineering

### *Sector of Mathematical Logic*

Proof theory of non-classical logics  
Automated deduction  
Decision procedures  
Boolean function complexity  
Lower bounds

## **RESEARCH PROJECTS CARRIED OUT IN 2012**

### **Projects Supported by University Budget**

**Methods and technologies to specify, model, and develop services-oriented software systems.** Prof. Dr. A. Čaplinskas (leader), D. Drungilas, Prof. Dr. D. Dzemydienė, R. Dzindzalieta, D. Drungilas, G. Gricius, M. Kurmis, Doc. Dr. A. Lupeikienė, J. Miliauskaitė, A. Miliauskas, Dr. S. Maskeliūnas, L. Paliulionienė, Dr. V. Paliulionis, S. Svanidzaitė, M. Šaučiūnas. 2012-2014.

Main results obtained in 2012:

It has been proposed how to improve J.Lin's conceptual model in order to integrate service discovery, contracting, and trustworth negotiation tools. Current methods to predict and classify the service composition properties have been investigated and generalized. The characteristics of the most important SOA (service-oriented architecture) systems development process components have been identified, classified, and generalized. A model of an adaptive system supporting decision making in dynamic domains has been created. The model allows the system to improve the quality of services on the basis of feedback information. A multi-layered architecture of a decision support system for monitoring of dangerous good transportation has been developed.

**Construction of deductive systems for non-classical logics; evaluation of lower bounds for algorithmic paradigms.** Assoc. Prof. Habil. Dr. R. Pliuškevičius (leader), Dr. R. Alonderis, Habil. Dr. S. Jukna, Assoc. Prof. Dr. J. Sakalauskaitė, A. Girčys, H. Giedra. 2012-2014.

Main results obtained in 2012:

The scientific research was realized in two areas: (1) construction of cut rule free and terminating sequent calculi for non-classical logics; (2) proving lower bounds for cutting plane and dynamic programming algorithms.

In the first area, the following problems have been investigated:

(a) elimination of the invariant rule from a sequent calculus for propositional linear tense logic (PLTL); (b) cut elimination from sequent calculi for multimodal logic of correlated logic. Concerning point (a), the invariant and cut rules free sequent calculus for PLTL is constructed; the calculus is proved to be sound and complete for a fragment of the logic. Concerning point (b), sequent calculi without cut rule for combinations is constructed.

In the second area, it is proved that polynomial-time cutting plane algorithms cannot approximate the clique problem by any nontrivial factor. A surprisingly efficient communication protocol for the biclique problem is found, showing that communication complexity arguments cannot lead to strong lower bounds for cutting plane algorithms solving this problem. A matching lower bound on the number of subproblems in any incremental dynamic programming algorithm for the Knapsack problem is also proved.

### **Ordered Research Projects**

*Joint Activity Agreement No. BS-580000-1892* with LLC „Algoritmu sistemas“ for the *eMentorius* project. Dr. S. Maskeliūnas. 2011-2012.

*Deutsche Forschungsgemeinschaft (DFG) grant SCHN 503/5-1: Limits of algorithmic paradigms.* Habil. Dr. S. Jukna. 2010-1013.

### **International Science Programmes and Projects**

European joint programme *Eurostars*' project *Production effectiveness navigator* (pen!6232 PEN). Prof. Dr. A. Čaplinskas, Doc. Dr. A. Lupeikienė. 2011-2014.

*Agreement No. 31V-27/LSS-580000-407* to fund *Eurostars* programme project *Production effectiveness navigator* (pen!6232 PEN). Funded by the Agency for Science, Innovation and Technology. Prof. Dr. A. Čaplinskas, Doc. Dr. A. Lupeikienė. 2012.

#### ***COOPERATION in the organization of conferences:***

Kaunas University of Technology (Lithuania)

Vilnius Gediminas Technical University (Lithuania)

Mykolas Romeris University (Lithuania)

University of Latvia (Latvia)

Riga Technical University (Latvia)

Tallinn University of Technology (Estonia)

University of Tartu (Estonia)

Institute for Informatics Problems of the Russian Academy of Science (Russia)

Institute for System Programming of the Russian Academy of Science (Russia)

A.P. Ershov Institute of Informatics Systems (Russia)

University of St.-Petersburg (Russia)

Belarusian State University of Informatics and Radioelectronics (Belarus)

Charles University in Prague (Czech Republic)

Technical University of Varna (Bulgaria)

Sofia University St. Kliment Ohridski (Bulgaria)

Slovak University of Technology in Bratislava (Slovakia)

University of Maribor (Slovenia)

University of Novi Sad (Serbia)

Poznań University of Technology (Poland)

Tampere University of Technology (Finland)

University of Vienna (Austria)

Aalborg University (Denmark)

University of Helsinki (Finland)

West University of Timisoara (Romania)

Florida Gulf Coast University (USA)

Karlstad University (Sweden)

KTH Royal Institute of Technology (Sweden)

London Metropolitan University (UK)

Norwegian University of Science and Technology (Norway)

University of Geneva (Switzerland)

University of Frankfurt (Germany)

St.Petersburg Scientific Center of Russian Academy of Science (Russia)



## ***OTHER SCIENTIFIC ACTIVITIES***

### **Prof. Dr. A. Čaplinskas**

- editorial board member of the journal *Informatica*, <http://www.mii.lt/informatica/editors.htm>;
- editorial board member of the journal *Computer Science and Information Technologies (Scientific papers university of Latvia)*, <http://www.lu.lv/materiali/apgads/raksti/756.pdf>;
- editorial board member of the *Scientific Journal of Riga Technical University Computer Sciences*, <http://versita.com/sjrtucs/editors/>;
- steering committee member of the annual East European Conference on Advances in Databases and Information Systems (ADBIS);
- steering committee member of the Central and Eastern European Conference on Software Engineering Techniques (CEE-SET), <http://cee-set.njszt.hu/committees>;
- steering committee member of the International Baltic Conference on Databases and Information Systems (BalticDB&IS), <http://www.mii.vu.lt/balticDBIS2012/index.php?q=conference-organisation>;
- program committee co-chair of the Tenth International Baltic Conference on Databases and Information Systems (BalticDB&IS'2012), Vilnius, Lithuania, July 8-11, 2012, <http://www.mii.vu.lt/balticDBIS2012/index.php?q=conference-organisation>;
- program committee member of the 16th East European Conference on Advances in Databases and Information Systems (ADBIS), Poznan, Poland, September 17-20, 2012, [http://adbis.cs.put.poznan.pl/prog\\_committee.php](http://adbis.cs.put.poznan.pl/prog_committee.php);
- program committee member of the 8th Central and Eastern European Conference on Software Engineering Techniques (CEE-SET), Moscow, Russia, November 1-2, 2012, <http://www.secr.ru/lang/ru-ru/about/program-committee>;
- program committee member of the Second International Conference on Business Intelligence and Technology (BUSTECH 2012), Nice, France, July 22-27, 2012, <http://www.iaria.org/conferences2012/ComBUSTECH12.html>;
- program committee member of the 18th International Conference on Information and Software Technologies (ICIST 2012), Kaunas, Lithuania, September 13-14, 2012, <http://isd.ktu.lt/icist2012/>;
- program committee member of the International Conference on Computer Systems and Technologies CompSysTech'12, Ruse, Bulgaria, June 22-23, 2012, <http://www.compsystech.org/index.php?cmd=dPage&pid=pc>;
- program committee member of the IADIS International Conference on Intelligent Systems and Agents 2012, Lisbon, Portugal, July 17-23, 2012, <http://www.isa-conf.org/committees.asp>;
- program committee member of the 5th Workshop on Information Logistics and Knowledge Supply (ILOG 2012), Nizhny Novgorod, Russia, September 24-26, 2012, [http://nnov.hse.ru/bir2012/wsp\\_logistics](http://nnov.hse.ru/bir2012/wsp_logistics);
- program committee member of the 24th International Conference on Advanced Information Systems Engineering (CAiSE'12), Gdańsk, Poland, June 25-29, 2012, <http://www.caise2012.univ.gda.pl/index.php?page=committee>.

### **Prof. Dr. D. Dzemydienė**

- editorial board member of the *Scientific Journal of Riga Technical University: Computer Sciences*, <https://ortus.rtu.lv/science/en/series/5>;

- coordinator of the doctoral consortium at the Tenth International Baltic Conference on Databases and Information Systems (BalticDB&IS'2012), Vilnius, Lithuania, July 8-11, 2012, <http://www.mii.vu.lt/balticDBIS2012/index.php?q=doctoral-consortium>.

**Doc. Dr. A. Lupeikienė**

- editorial board member of the journal *Informatica*, <http://www.mii.lt/informatica/editors.htm>;
- editorial board member of the *Scientific Journal of Riga Technical University: Computer Sciences*, <http://versita.com/sjrtucs/editors/>;
- program committee member and publishing co-chair of the Tenth International Baltic Conference on Databases and Information Systems (BalticDB&IS'2012), Vilnius, Lithuania, July 8-11, 2012, <http://www.mii.vu.lt/balticDBIS2012/index.php?q=conference-organisation>.

**Dr. S. Maskeliūnas**

- program committee member and local organising committee chair of the Tenth International Baltic Conference on Databases and Information Systems (BalticDB&IS'2012), Vilnius, Lithuania, July 8-11, 2012, <http://www.mii.vu.lt/balticDBIS2012/index.php?q=conference-organisation>.

**Prof. Habil. Dr. S. Jukna**

- scientific board member of ECCC, Electronic Colloquium on Computational Complexity, [http://eccc.hpi-web.de/colloquium/scientific\\_board/](http://eccc.hpi-web.de/colloquium/scientific_board/);
- editorial board member of the Lithuanian Mathematical Journal, [http://www.mii.lt/index.php?siteaction=pages.ed%E2%8C%A9=en&page=lmj\\_an#Board](http://www.mii.lt/index.php?siteaction=pages.ed%E2%8C%A9=en&page=lmj_an#Board).

**Assoc. Prof. Habil. Dr. R. Pliuškevičius**

- editorial board member of the Lithuanian Mathematical Journal, [http://www.mii.lt/index.php?siteaction=pages.ed%E2%8C%A9=en&page=lmj\\_an#Board](http://www.mii.lt/index.php?siteaction=pages.ed%E2%8C%A9=en&page=lmj_an#Board);
- reviewer of Mathematical Reviews (USA), <http://www.ams.org/mr-database>;
- reviewer of Computing Reviews (USA), <http://www.computingreviews.com/>.

## 5.7. STOCHASTIC PROCESSES DEPARTMENT

Akademijos 4, LT-08663 Vilnius  
Tel. (+370~5) 2109 317  
E-mail Donatas.surgailis@mii.vu.lt

**Head** – Prof. Habil. Dr. Donatas Surgailis

**STAFF**

**Principal researchers:** 1. Prof. Dr Liudas Giraitis (associated scientist)  
2. Prof. Habil. Dr Remigijus Leipus  
3. Prof. Dr Remigijus Mikulevičius (associated scientist)

4. Prof. Habil. Dr Rimas Norvaiša
5. Prof. Habil. Dr Alfredas Račkauskas
6. Prof. Habil. Dr Artūras Dubickas

**Senior researchers:** 1. Dr Arvydas Astrauskas  
2. Prof. Habil. Dr Bronius Grigelionis  
3. Dr. Martynas Manstavičius  
4. Dr. Marijus Vaičiulis  
5. Prof. Dr. Jonas Šiaulyš

**Researcher:** 1. Dr Remigijus Petras Gylys

**Junior researchers:** 1. Vaidotas Characiejus  
2. Donata Puplinskaitė

**Specialists:**

- |                      |                           |
|----------------------|---------------------------|
| 1. Šarūnas Dirmeikis | 3. Vytautė Pilipauskaitė  |
| 2. Ieva Grublytė     | 4. Gintaras Valiukevičius |

**Affairs manager:** 1. Jurgita Zinkevičienė

**Doctoral students:**

1. Raimondas Malukas
2. Andrius Škarnulis

**RESEARCH INTERESTS** inference for long memory processes, modeling financial data, long range dependence, heavy tails, aggregation, self-similar processes, Levy processes, rough paths, concrete functional calculus, stochastic partial differential equations, random Hamiltonians, MV-algebras, insurance mathematics.

**RESEARCH PROJECTS CARRIED OUT IN 2012**

**Projects Supported by University Budget**

Investigation of fractal properties of random processes and random fields. R. Norvaiša, D. Surgailis, 2012-2013.

A new nonparametric estimator of the local Hurst function of a multifractional Gaussian process based on the increment ratio (IR) statistic is defined. In a general frame, the point-wise and uniform weak and strong consistency and a multidimensional central limit theorem for this estimator are established. Similar results are obtained for a refinement of the generalized quadratic variations (QV) estimator. The example of the multifractional Brownian motion is studied in detail. A simulation study is included showing that the IR-estimator is more accurate than the QV-estimator.

**Projects, Programmes, Issues Supported by Lithuanian State Science and Studies Foundation**

Project: Concrete functional calculus and probability theory: new methods and their applications. R. Norvaiša, 2012-2014.

Project: Modelling long memory and heavy tails in finance and insurance. D. Surgailis, R. Leipus. 2011-2012

**COOPERATION**

Massachusetts Institute of Technology (USA)

Michigan State University (USA)  
Universite Paris 1 Sorbonne (France)  
Universite de Nantes (France)  
Universite de Cergy (France)  
London University (United Kingdom)  
Vilniaus Gedimino Technikos Universitetas

### ***OTHER SCIENTIFIC ACTIVITIES***

#### A. Dubickas:

- Member of the editorial board of "Uniform Distribution Theory".
  - Member of the editorial board of "Central European Journal of Mathematics".
  - Member of the editorial board of the "Conference Papers in Mathematics".
  - Member of the editorial board of the "Lithuanian Mathematical Journal".
  - Member of the editorial board of "Šiauliai Mathematical Seminar".
- Invited speaker at the 3rd international conference on uniform distribution theory, Smolenice, Slovakia, June 25-29, 2012.

#### B. Grigelionis:

- Member of Editorial Boards of the Lithuanian Mathematical Journal and Nonlinear --- Analysis: Modeling and Control.
- Conference of the Lithuanian Mathematical Society in Klaipėda June 11-12, 2012.

#### R. Norvaiša:

- Associate editor of the *Lithuanian Mathematical Journal*

#### R. Leipus:

- Associate editor of the *Lithuanian Mathematical Journal*.
- Member of the editorial board of "Pinigų studijos (Monetary Studies)".
- Research visit to Nantes University (France), 2012 01 15-28.
- Conference "Statistical Modelling of Financial Data", Graz (Austria) 2012 05 23-26.  
Invited talk "Asymptotics of partial sums of linear processes with changing memory parameter".
- Participant of the 6th European Congress of Mathematics, Krakow (Poland), 2012 07 01-07.
- Seminar at Aarhus University (Denmark), 2012 09 19-22. Talk "Asymptotics of partial sums of linear processes with changing memory parameter".

#### D. Surgailis:

- Associate editor of the *Lithuanian Mathematical Journal*.
- Invited speaker of the conference
- Statistical Methods for Financial Data III, May 23-27, 2012  
Graz, Austria
- Visiting professor at Laboratoire de Mathematiques Jean Leray, Universite de Nantes, France, April, 2012

#### J. Šiaulyš:

- Member of the editorial board of the "Lithuanian Mathematical Journal". Reviewer for Mathematical Reviews.
- Reviewer for Zentralblatt MATH.