

Summary report on research accreditation

I. General information

Name of organization	Institute of Mathematics and Computer Science
Organization type (<i>to underline</i>)	<u>Research institute</u> High education institution Ministerial research institute
Research direction (s) of organization	Theoretic and applied research in algebra and adjacent domains, in differential equations, mathematical modelling and computer science.
Correlation with strategic research direction (s) of activity in the field of science and innovation for 2013-2020	16.02 and 18.02 Materials, technology and innovative products I. Priority direction: Mathematical support in finding solutions to the country's complex problems Objectives: 1. Algebraic systems and differential equations for applications in cryptography, biology, ecology, and power engineering. 2. Mathematical modelling of the deterministic and stochastic dynamic processes as a support for the society development. 3. Mathematical and high-performance computing methods, advanced numerical algorithms and supercomputers technologies for utilization in scientific research and innovative teaching. 4. Topological-algebraic structures and applications in analysis, automata theory and economical modelling. 5. Fundamental studies in Discrete geometry, Optimal control and Evolutionary systems with practical aspects for quasi-crystals. II. Priority direction: Information systems and technologies Objectives: 1. Research for advanced and perspective technologies (distributed computations: methods, tools, application execution environments; molecular computations). 2. Information systems for economic activities management. 3. Information systems for research-development-innovation activity management. 4. Information tools for collaborative nets and virtual communities. 5. Development of intelligent systems with impact on services provided to citizens in the information society. 6. Information security.
Evaluated period	2010-2014
Web of organization	www.math.md

II. Research capacity (annual average for evaluated period)

Total number of employees	91.5					
Number of scientific researches	52.5					
Number of researches who possess honorific titles, scientific degrees, scientific and scientific-didactical titles	ASM full members 2.5	ASM corresp. Members 2.5	Professor 9.7	Associated professor 17.5	Dr.hab. 16	Dr. (PhD) 26.5
Number of researches involved in	European Commission	United Nations programmes and	Bilateral programmes	Others		

international projects	programmes FP7 – 10 STCU - 32	funds -	financed from the national budget 22	78
Number of young researches (under 35 years old)	PhD students 12.4		Others 9.4	
Financial resources - revenues (thousand MDL)	Public budget 5484.3		Special means 292.7	
Categories of special means (thousand MDL)	National 148.7		International 144	
Distribution of expenditures (thousand MDL)	Salary 3939.7	Procurement of scientific equipment 117.8	Travelling for scientific purposes (travel, accommodation, per-diems, etc.) 193.3	Other 1233.6
List of 3 basic research methods, installations, technologies (per accredited field)	MS Computer Cluster Server 2003; WinEdit; Processing Image Systems; Net Beans IDE for elaboration applications in Java; Reduce 3.8; Maple 9.5; OpenMP and MPI.			
List of provided scientific services	-			
List of editorial activities	3 numbers of the journals "Buletinul Academiei de Științe a Republicii Moldova. Matematica" (category A), "Computer Science Journal of Moldova" (category B ⁺), and 2 numbers of the journal "Quasigroups and Related Systems" (category A) are published annually.			

III. Distribution of number of research projects and themes during evaluated period

ASM institutional projects	2010 5	2011 3	2012 3	2013 3	2014 3
ASM projects in the frame of State Programmes	2010 1	2011 1	2011 2	2013 2	2014 2
ASM technological transfer projects	2010 1	2011 1	2011 -	2013 1	2014 2
ASM projects for equipment procurement	2010 -	2011 -	2011 -	2013 -	2014 -
ASM projects for young researches	2010 3	2011 2	2011 1	2013 3	2014 2
ASM projects in the frame of bilateral programmes	2010 3	2011 3	2012 2	2013 4	2014 2

International projects/grants	2010 4	2011 1	2012 2	2013 5	2014 4
List of 3 representative international projects/grants	<p>1. STCU-4032, Power and efficiency of natural computing: neural-like P (membrane) systems (Puterea și eficiența calculului natural: P sisteme (membranare) de tip neuronal).</p> <p>2. STCU-4035, Informational tools for assistance of sonographic examinations (Instrumentar informatic pentru asistarea examinărilor ultrasonografice)</p> <p>3. 316338, FP7-PEOPLE-2012-IRSES-316338, Dynamical Systems and Their Applications</p>				
Research contracts	2010 2	2011 1	2012 -	2013 2	2014 2
List of 3 representative research contracts	<p>1. Contract N. 20 from 20.11.2010 "Creating segments of transport network given on the base of 1Gbps technology implementation." Beneficiary - Institute of Microbiology and Biotechnology of the ASM. Funding: 20 000 lei.</p> <p>2. Contract N. 48 of research and development services from 21. 08. 2013, Institute for Encyclopaedic Studies. Funding: 7200 lei</p> <p>3. Contract N. 60 of research and development services from 29. 07. 2014, Institute for Encyclopaedic Studies. Funding: 7200 lei</p>				

IV. Scientific publications

Total number of publications abroad	Books/Collection/Preprints 9/2/21	Chapters in books 7	Journal papers 55
Total number of publications in ISI journals and books	Books 1	Chapters in books 2	Journal papers 82
Total number of publications in the country	Books/Collections/Preprints 4/3/2	Chapters in books 4	Journal papers 101
Total number of conference abstracts	International abroad 11	International in the country 6	National 7
List of 5 representative publications (per accredited field)	<p>1. DOVBUSH, P. V. Boundary behaviour of Bloch functions and normal functions. <i>Complex Variables and Elliptic Equations</i>. 55 (1-30), 2010, 157 – 166, ISSN: 1747-6933 (IF: 1,08)</p> <p>2. ALHAZOV, A; IVANOV, S; ROGOZHIN, YU. Polymorphic P Systems. <i>Lecture Notes in Computer Science</i>, Volume 6501, 2011, 81-94. (IF: 0,402)</p> <p>3. VULPE, N. Characterization of the finite weak singularities of quadratic systems via invariant theory. <i>Nonlinear Analysis. Theory, Methods and Applications</i>, 2011, 74 (4), 6553–6582. ISSN: 0362-546X, 2011.06.040 (IF: 1.279).</p> <p>4. KOLESNIK, A.D. Probability law for the Euclidean distance between two planar random flights. <i>Journal of Statistical Physics</i>, Springer. 2014, 154(4), 1124-1152. (IF: 1.65).</p> <p>5. LOZOVANU, D.; PICKL, S. A dynamic programming approach for finite Markov processes and algorithms for the calculation of the limit matrix in Markov chains. <i>Optimization</i>. 2011, 60, Issue10-11, 1339-1358.</p>		

	ISSN 0233-1934. (IF: 0.8).
List of 5 cited publications	<p>VULPE, N.; LLIBRE, J.; MAHDI, A. Characterization of the finite weak singularities of quadratic systems via invariant theory Vulpe, N. 2011 <i>Nonlinear Analysis, Theory, Methods and Applications</i>, cited 14.</p> <p>ALHAZOV, A.; VERLAN, S. Minimization strategies for maximally parallel multiset rewriting systems. 2011, <i>Theoretical Computer Science</i>, cited 8.</p> <p>KOLESNIK, A.; PINSKY, M.A. Random Evolutions Are Driven by the Hyperparabolic Operators. <i>Journal of Statistical Physics</i>, cited 5.</p> <p>LOZOVANU, D.; PICKLE, S. Algorithms for solving stochastic control problem on networks. 2011 CTW 2011 - <i>Proceedings of the Conference</i>, cited 5.</p> <p>DOVBUŞ, P. The Lindelöf principle in C^n. <i>Central European Journal of Mathematics</i>. 2013, Volume 11, Issue 10, cited 2.</p>

V. Innovation outputs

Total number of patents	Registered in the country -	Registered abroad -	Implemented -
Total number of new developed methods and technologies	Registered 1	Non-registered	Implemented
Total number of new scientific products	Registered 1	Non-registered 5	Implemented 1
List of 5 representative innovation outputs (per accredited field)	SonaRes decision support system for sonographic assistance examinations		

VI. Other outputs

Total number of scientific outputs for central and local authorities (draft of law, strategies etc.)	3		
Total number of scientific outputs for educational institutions	Handbooks for high education 27	Handbooks for pre-university institutions 1	Number of researchers – supervisors of license and master theses 23

VII. Major scientific and innovation achievements

Short description of main scientific results and its confirmation (by awards, citations, development of international projects etc.)	<p>Finite numerical estimation of Lyapunov algebraic independent polynomials, which solve thoroughly the generalized problem of the centre and focus separately for every differential system (originally formulated by Henri Poincaré, about 130 years ago).</p> <p>Necessary and sufficient optimality conditions for stochastic discrete control problems with optimality criteria of average and discounted total cost have been proven and algorithms for determining the optimal stationary strategies for these problems have been elaborated.</p> <p>New formal computing models were proposed on biomolecular</p>
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	<p>principles: DNA models, systems TVDH, networks of evolutionary processors, transitional, communicative, polymorphic P systems (membranes), with insertion-deletion, “splicing” rules, active membranes, and replications.</p> <p>A new model of processing prefixed trees using P-systems with string and active membranes has been proposed.</p> <p>A range of published result are highly cited, e.g. c.m. Nicolae Vulpe (in correspondence with SCOPUS Data Base) – 233 citations, h-index – 10; dr.hab. Artiom Alhazov (in correspondence with SCOPUS Data Base) – 358 citations, h-index – 9, dr.hab. Alexander Kolesnik (in correspondence with SCOPUS Data Base) – 95 citations, h-index -5.</p>				
Number of researchers invited as speakers at international conferences	2010 10	2011 8	2012 11	2013 10	2014 16
Short description of technological transfer and innovation results and its certification by implementation	<p>1. Implementation of Decision Support System (DSS) in clinical ultrasound examination of hepato-biliary-pancreatic area SonaRes 13 in daily practice and in clinical decision making in the medical center "ANAMARIA-MED" SLR.</p> <p>Act of implementation and use of DSS from December 29, 2014.</p> <p>2. Mathematical model that can evaluate risks of damaging the containers with toxic and inflammable liquid was created.</p> <p>3. For digitization and recognition of national historic and linguistic thesaurus new methods for text recognition, using modern software and information system "Linguistic reusable resources" www.math.md/elrr), were proposed.</p>				
Number of defended dr./dr. hab. theses per year	2010 2 dr.hab	2011 1 dr.	2012 1 dr.	2013 1 dr.hab./2 dr.	2014 2 dr.

VIII. Present/further involvement in the Horizon 2020 (FP7)

FP7 ongoing project:

316338, FP7-PEOPLE-2012-IRSES-316338, Dynamical Systems and Their Applications
Horizon 2020 proposal under examination:

Horizon 2020. HPC, Implementations of unconventional computing solutions for hard computational problems. Topic: FETHPC-1-2014 - FET-Proactive - towards exascale high performance computer. Type of action: RIA - Research and Innovation actions. Proposal number: 671690. Proposal acronym: HUCOSOL. Project is in the process of verification.

IX. Mathematics and Computer Science and its evaluation by the National Council for Accreditation and Attestation of the Republic of Moldova

Very good

X. Category (A,B,C) attributed by the National Council for Accreditation and Attestation of the Republic of Moldova to the Institute of Mathematics and Computer Science

Category A

XI. Institutional development actions planned for the next 5 years

The Institute will continue to hold the leading position in research in mathematics and computer science, while focusing its activity on the directions needed nationally and internationally recognized.

The purpose of the Institute's activity consists in:

- research orientation towards more impact on solving our country's problems, while ensuring their integration in the context of international research programs;
- preservation and development of scientific potential.

To achieve this purpose the following will be realized:

I. Identifying the research directions which would lead to a harmonious join of actual research with practical solutions proposal, ensuring the following succession: fundamental research - application - implementation.

II. Developing human potential; solving the problem of continuity of researchers' generations.

III. Expanding international cooperation.

IV. Streamline the management.

Director of the Institute of Mathematics and Computer Science
of the Academy of Sciences of Moldova,
doctor in habilitation

Svetlana COJOCARU