Institute of Mathematics CAS, v. v. i.

Identification number: 67985840
Address: 115 67 Praha 1, Žitná 609/25

Annual report on activities and economic management in 2024

English summary

The Annual report was discussed by the Supervisory Board of the Institute on June 12, 2025 and discussed per rollam by the Board of the Institute on June 10 to June 13, 2025.

Contents

1 The Institute

The Institute of Mathematics of the Czech Academy of Sciences, v. v. i. (“the Institute” or “IM”), is a public research institution according to the Act No. 341/2005 Coll.

The founder of the Institute is the Czech Academy of Sciences seated at Praha 1, Národní street 1009/3, ZIP code 117 20.

The Institute was founded in order to carry out scientific research in the field of mathematics, to contribute to the utilisation of its research results, and to provide the research infrastructure.

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IN: 67985840
TIN: CZ67985840

1.1 Foundation deed (unofficial translation)

Based upon Act No. 283/1992 Coll., on the Czech Academy of Sciences, as subsequently amended, and upon Act No. 341/2005 Coll., on public research institutions, as subsequently amended, and further, in accordance with the Statutes of the Czech Academy of Sciences issued on 24 May 2006, the Czech Academy of Sciences (hereinafter CAS) hereby issues the Full Text of the Foundation Deed of the Institute of Mathematics of the CAS (in Czech "Matematický ústav AV ČR, v. v. i.") dated 28 June 2006 (English version dated 20 December 2006), as subsequently amended by the resolution of the twentieth session of the Academy Council of the CAS held on 15 July 2014 which changed English translation of the name of the CAS from the Academy of Sciences of the Czech Republic to the Czech Academy of Sciences as of 1 January 2015:

I.

(1) The Institute was incorporated into the Czechoslovak Academy of Sciences (hereinafter CSAS) under the name the Mathematical Institute of the CSAS by a resolution of the third plenary meeting of the Government Commission for the Establishment of the CSAS held on 30 March 1952, which took effect on 1 January 1953. Under section 18 (2) of Act No. 283/1992 Coll., the Institute became an entity of the CAS as of 31 December 1992.

(2) Under Act No. 341/2005 Coll., the legal status of the Mathematical Institute of the CAS has been transformed from a state contributory organisation into a public research institution (abbreviated in Czech as v. v. i.) from 1 January 2007.

II.

(1) The Institute of Mathematics of the CAS (hereinafter IM) is established for an indefinite period as a legal entity with identification number 67985840, and is located in Prague 1, Žitná 609/25, Postal Code 115 67.

(2) The founder of the IM is the CAS, an organisational body of the state, identification number 60165171, headquartered in Prague 1, Národní 1009/3, Postal Code 117 20.

III.

(1) The purpose for which the IM has been established is to carry out scientific research in the field of mathematics, to contribute to the utilisation of its research results, and to provide the research infrastructure.

(2) The principal activity of the IM is scientific research in the fields of mathematics and its applications. The IM contributes to raising the level of knowledge and education and to utilising the results of scientific research in practice. It acquires, processes and disseminates scientific information, issues scientific and professional publications (monographs, journals, proceedings, etc.). It provides scientific assessments, professional opinions and recommendations, consulting and advisory services. In cooperation with universities, the IM carries out doctoral study programmes and provides training for young scientists. Within the scope of its activity, the IM promotes international cooperation, including the organisation of joint research projects with foreign partners, participation in exchange programmes for scientists and the exchange of scientific information, as well as the preparation of joint publications. The IM organises scientific meetings, conferences and seminars on the national and international levels and provides the infrastructure for research, including the provision of accommodation for its employees and guests. It pursues its aims both independently and in cooperation with universities and other research and professional institutions.

IV.

(1) The director, the Board and the Supervisory Board are the bodies of the IM. The director is the statutory body of the IM and is entitled to act on behalf of the IM.

(2) Basic organisational units of the IM are scientific departments responsible for research and development, and service departments responsible for provision of the infrastructure.

(3) The detailed organisational structure of the IM is regulated by rules of organisation issued by the director after being approved by the Board.

V.

The foundation deed in its present form took effect on 1 January 2015.

Prof. Jiří Drahoš
President of the CAS

1.2 Governing bodies (as of December 31, 2024)

Director: Doc. Dr. Ing. Miroslav Rozložník, DSc.

Deputy Director: Mgr. Vojtěch Pravda, Ph.D., DSc.

Board of the Institute:

Chair:	RNDr. Martin Markl, DrSc.
Vice-chair:	Mgr. Vojtěch Pravda, Ph.D., DSc.
Members at large:	Prof. RNDr. Zuzana Došlá, CSc., DSc. (Masaryk University)
	Prof. RNDr. Pavel Drábek, DrSc. (University of West Bohemia in Pilsen)
	Prof. RNDr. Eduard Feireisl, DrSc.
	Prof. RNDr. Michal Křížek, DrSc.
	Prof. Wieslaw Kubiś, Ph.D.
	RNDr. Šárka Nečasová, CSc., DSc.
	Doc. Mgr. Milan Pokorný, Ph.D., DSc. (Charles University)
	Ing. Jakub Šístek, Ph.D.
	Prof. RNDr. Jan Trlifaj, CSc., DSc. (Charles University)

Supervisory Board:

Chair:	doc. RNDr. Tomáš Kostelecký, CSc. (Academy Council of the CAS)
Vice-chair:	Mgr. Pavel Hubáček, Ph.D.
Members at large:	Prof. RNDr. Jan Hamhalter, CSc. (Czech Technical University in Prague)
	Prof. RNDr. Luboš Pick, CSc., DSc. (Charles University)
	prof. Ing. Miroslav Tůma, CSc. (Charles University)

The director of the Institute cooperated with the Board of the Institute and relied on an informal advisory board formed by the chair of the Board Martin Markl, deputy director Vojtěch Pravda, the scientific secretary and project manager Beata Kubiś, head of the Administration Department Jan Bíža, head of the IT Department Martin Jarník.

The **Board of the Institute** held five meetings, two of them per rollam. The topics the Board discussed and approved included among others:

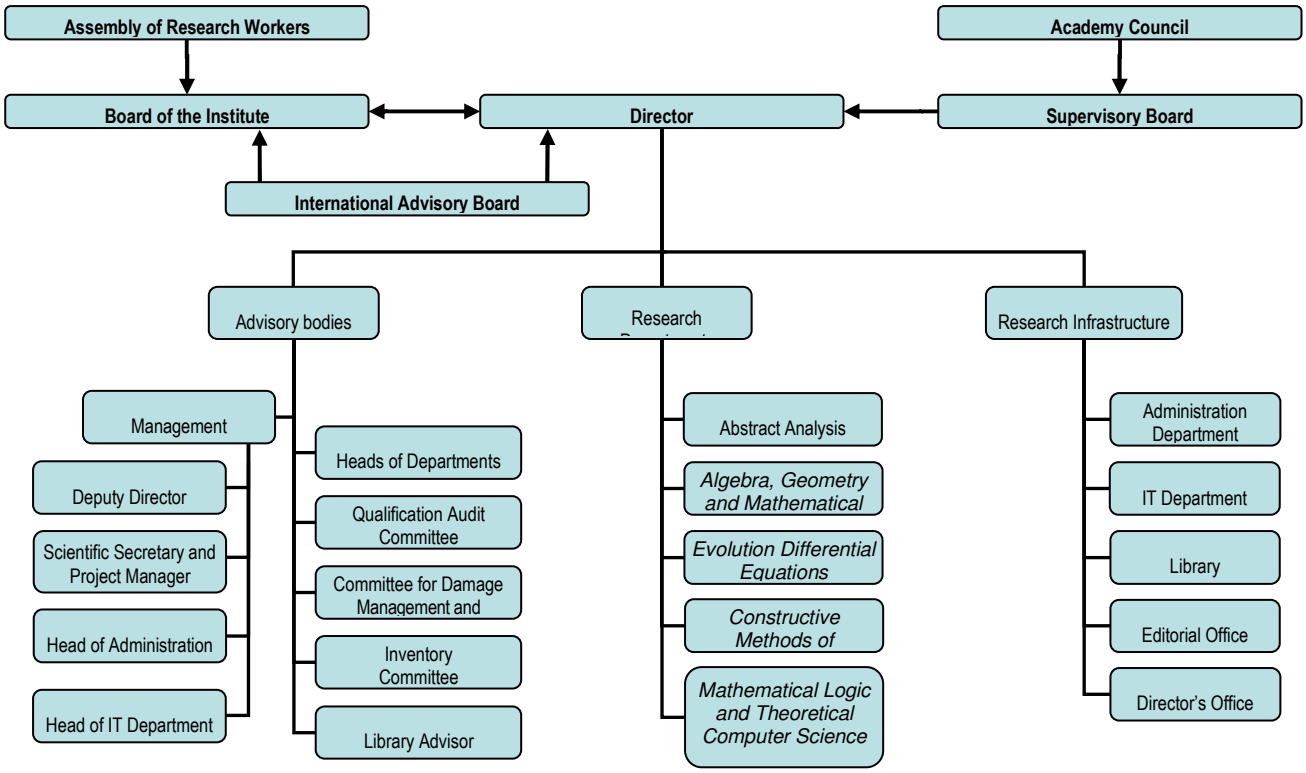
- budget of the Institute for 2024 and the medium-term financial outlook for 2025–2026,
- annual report on activities and economic management in 2023 and auditor's report on financial statements,
- selection of H. Wirzenius for the postdoctoral position in the Academy's programme supporting prospective human resources,
- recommendation to invite Prof. K. Ono (University of Kyoto, Japan) for the Eduard Čech Distinguished Visitor position,
- selection of Z.Silber for the postdoctoral position in the Academy's programme supporting prospective human resources,

The **Supervisory Board** held four meetings, two of them per rollam. The topics they discussed and approved included among others:

- discussion about the proposal of the budget of the Institute for 2024 and the medium-term financial outlook for 2025–2026, about the annual report on activities and economic management in 2023 and about auditor's report on financial statements,
- approval of lease agreements and amendments extending lease agreements for flats in the Institute's building.

Institute of Mathematics, Czech Academy of Sciences

Scheme of the organizational structure



The Institute publishes three internationally recognized mathematical journals:

- Czechoslovak Mathematical Journal
- Mathematica Bohemica
- Applications of Mathematics
- Higher Structures

The director nominates the Editorial Boards and the Editors-in-Chief.

The Institute is maintaining and developing the Czech Digital Mathematics Library DML-CZ accessed at https://dml.cz and participates in the development of the European Digital Mathematics Library EuDML accessed at https://eudml.org. The Institute operates the Prague Zentralblatt Editorial Group contributing to the production of the database zbMATH.

2 Research activities

2.1 Characteristics of the principal activity

The principal activity of the IM is to support fundamental research in the fields of mathematics and its applications, and to provide necessary infrastructure for research. The IM contributes to raising the level of knowledge and education and to utilising the results of scientific research in practice. It acquires, processes and disseminates scientific information including scientific publications (journals, proceedings, monographs etc.). In cooperation with universities, the IM carries out doctoral study programmes and provides training for young scientists. The IM promotes international cooperation, including the organisation of joint research projects with foreign partners and participation in exchange programmes. The IM organises scientific meetings, conferences and seminars on the national and international levels.

Research in the Institute focuses on mathematical analysis (differential equations, numerical analysis, functional analysis, theory of function spaces), algebraic and differential geometry, mathematical physics, mathematical logic, complexity theory, combinatorics, set theory, numerical linear algebra, general and algebraic topology, optimization and control.

2.2 Departments

Abstract Analysis

Main research themes of the department members can be described as the study and classification of mathematical structures, using advanced methods of logic, set theory, and category theory, as well as modern tools of mathematical analysis and algebra. Abstract analysis refers to these areas of science where mathematical logic plays a significant role, even though it is not the main object of study. These areas include descriptive set theory, topology, Banach space theory, and the theory of C* algebras.

Algebra, Geometry and Mathematical Physics

The department consists of researchers interested in algebraic and differential geometry and in closely related areas of mathematical physics. The research is focused on mathematical aspects of modern theoretical models of physics of microcosmos and cosmology related to logical correctness of physical hypotheses and mathematical models aiming at understanding the nature of matter and space. Research topics include representation theory and its applications to algebraic geometry, homological algebra, algebraic topology, applied theory of categories, tensors classification, generalized theory of gravitation, and study of Einstein equations.

Constructive Methods of Mathematical Analysis

The department focuses on mathematical modelling of complex physical processes that involve an immense amount of data and require advanced implementations on parallel computer architectures. The main topics include theory and applications of numerical methods for partial differential equations, a posteriori error analysis, computational methods of numerical linear algebra, matrix theory, domain decomposition and multilevel methods. Another topic is presented by methods of flow-filed analysis, mostly for vortex identification. Members of the department are involved in the Jindřich Nečas Centre for Mathematical Modeling (http://ncmm.karlin.mff.cuni.cz/) and in the network for industrial mathematics EU-MATHS-IN.CZ (http://www.eu-maths-in.cz/), part of the European network EU-MATHS-IN (http://eu-maths-in.eu/).

Evolution Differential Equations

The department focuses on qualitative theory of partial differential equations in mechanics and thermodynamics of continuum, in biology, chemistry and other natural and technical sciences. The research aims at verification of correctness and other fundamental properties of mathematical models and at the possibility of providing theoretical predictions of future development of systems without the full knowledge of the initial state. The core are work equations describing motion of various kinds of

fluids, including exchange heat and interaction with solid bodies. The attention is also paid to processes in solid materials, focusing on mathematical modelling of memory in multifunctional substances, on dynamical behaviour of bodies in contact with neighbourhood, and on phase transitions. Several members investigate modern theory of integration in connection with ordinary differential equations.

Mathematical Logic and Theoretical Computer Science

The research conducted in the department concerns several loosely connected areas. The main ones are theoretical computer science and mathematical logic; other important areas are combinatorics, control theory, automata theory and differential geometry. The main topic in theoretical computer science is computational complexity, which is connected with another topic, proof complexity, an area of research on the border of theoretical computer science and mathematical logic. Other main topics of mathematical logic studied in the department are set theory and formal arithmetic.

2.3 Research centres

Jindřich Nečas Centre for Mathematical Modeling (http://ncmm.karlin.mff.cuni.cz/) is a consortium of the Institute of Mathematics, the Faculty of Mathematics and Physics of the Charles University, and the Institute of Computer Science CAS. It was established in 2013 to continue the efforts of a joint project funded by the Ministry of Education, Youth and Sports in 2005–2011. Its general goal is to establish a strong research team in the field of mathematical properties of models in continuum mechanics and thermodynamics, developed by an intensive collaboration of important research groups at participating institutions and their goal-directed collaboration with top experts from abroad. Organization of lecture courses and the everyday interaction with PhD and undergraduate students aims at upbringing new generation of competent scientists and forming a basis for a strong and stable research team.

DIMATIA – Centre for Discrete Mathematics, Theoretical Computer Science and Applications (http://dimatia.mff.cuni.cz/) is a consortium of the Faculty of Mathematics and Physics of the Charles University, the Institute of Mathematics and the Institute of Chemical Technology in Prague. It was established in 1996 with the aim to foster research in all fields of discrete mathematics and its modern applications and relationship to computer science, operations research and fields as diverse as biology, chemistry and social sciences. The centre organizes a continuing programme of workshops, conferences and research visits, postdoctoral positions announced and jointly supported by the partners and short-term visits of senior researches. DIMATIA created an extensive international network with 13 further research institutions.

2.4 Research output

In 2023, members of the Institute published the total of 169 journal and proceedings papers, including two monographs. The following 13 results were selected to illustrate the output. The detailed information about all publications is available at Institute's web site http://www.math.cas.cz/ in section Research / Publications.

[1] **Hrbek, M.** Topological endomorphism rings of tilting complexes. Journal of the London Mathematical Society 2024, 109(6), Article ID e12939. DOI: 10.1112/jlms.12939.

Morita theory, originally developed by Kiiti Morita in the 1950s, provides a comprehensive answer to the natural question of when the categories of modules over two given rings are categorically equivalent. While it has become an indispensable tool in the representation theory of finite-dimensional algebras, the advent of reflection functors in the 1970s necessitated a more flexible framework. This led to the development of the theory of compact tilting modules and complexes, culminating in 1989 with J. Rickard's derived Morita theory of triangle equivalences between derived module categories. The present work extends Rickard's results to a far-reaching topological generalization. It allows one of the rings to be equipped with a complete linear topology and replaces the standard module category with the topological algebra categories of discrete modules and L. Positselski's contramodules. This advancement delivers a full Morita context for non-compact tilting objects, introduced in their initial form

roughly three decades ago. Excitingly, its first significant applications are already emerging in commutative algebra - a domain where classical derived Morita theory is inapplicable.

[2] **Bartoš, A**., **Bice, T.**, Dasilva Barbosa, K., **Kubiś, W.** The weak Ramsey property and extreme amenability. Forum of Mathematics, Sigma. 2024, 12(November), Article ID e96. DOI: 10.1017/fms.2024.64.
The work explores the famous Kechris - Pestov - Todorcevic (KPT) correspondence between finite combinatorics and topological dynamics. Our main results can be viewed as a far reaching generalization and extension of the KPT correspondence, supported by new examples.

[3] **Feireisl, E.,** Lu, Y., Sun, Y. Unconditional stability of equilibria in thermally driven compressible fluids. Archive for Rational Mechanics and Analysis. 2024, 248(6), Article ID 98. DOI: 10.1007/s00205-024-02044-1
We show that small perturbations of the spatially homogeneous equilibrium of a thermally driven compressible viscous fluid are globally stable. Specifically, any weak solution of the evolutionary Navier–Stokes–Fourier system driven by thermal convection converges to an equilibrium as time goes to infinity. The main difficulty to overcome is the fact the problem does not admit any obvious Lyapunov function.The result applies, in particular, to the Rayleigh–Bénard convection problem.

[4] **Kolář, V., Šístek, J.** Two complementary eigen-based geometric properties of a vortex. Physics of Fluids. 2024, 36(11), Article ID 111703. DOI: 10.1063/5.0238534
The connection of vortical motion with the presence of complex eigenvalues of the velocity gradient tensor has a rich history with the pioneering paper introducing the so-called vortex-identification Δ-criterion in 1990. In that paper, however, a statement appears implying that dominance of vorticity over strain rate is a necessary condition for the existence of complex eigenvalues, which has been recalled in full many times in the literature dealing with vortices.
In our paper we provide a counterexample and show that complex eigenvalues may exist even for arbitrarily small non-zero value of vorticity if the eigenvectors satisfy a maximum value of a newly introduced 3D geometric measure termed as "cylindricity". It can be reduced to 2D. The usefulness of cylindricity as a characteristics of vortex geometry has been shown for several basic flow problems using numerically simulated data. This eigenvector-based measure is complementary to the eigenvalue-based orbital compactness proposed in our previous paper [V. Kolář and J. Šístek, “Orbitally compact and loose vortex regions,” Phys. Fluids 35, 121708(2023)].
The paper was published in the prestigious journal Physics of Fluids, and it was selected by the editors among the approx. 10 % of the "Featured articles".

[5] Braunfeld, S., **Chodounský, D.**, de Rancourt, N., Hubička, J., Kawach, J., Konečný, M. Big Ramsey degrees and infinite languages. Advances in Combinatorics. 2024, January, Article ID 26. DOI: 10.19086/aic.2024.4
The paper is a part of the program of investigating of big Ramsey degrees, which looks at the combinatorial structure of countable object and their finite subobjects. We prove that free structures have finite big Ramsey degrees as long as there is only a finite number of relations of each arity. This is a first result of this type for structures of infinite languages..

[6] **Komenda, J.**, Masopust, T. Supervisory control of modular discrete-event systems under partial observation: Normality. IEEE Transactions on Automatic Control. 2024, 69(6), 3796-3807. DOI: 10.1109/TAC.2023.3333792
This paper shows how to compute scalable supervisors for large automata networks with partial observations and many communicating components and provides new and weaker sufficient conditions under which local controllers running in parallel achieve the same language of the controlled system as the monolithic maximally permissive (optimal) supervisor for the global system. This is very important given the fact that there are no polynomial time algorithms for computing supervisors for systems with partial observations, which means the computation monolithic optimal supervisor for the global system is double exponential in the number of components (the number of states of the global system is exponential in the number of components and the computation of supervisors is exponential in the number of states). The proposed modular computation solves this issue and the controller synthesis is in the worst case exponential in the size of the local components, which are small in practice.

[7]. **Kalousek, M.**, **Mitra, S.**, **Nečasová, Š.** The existence of a weak solution for a compressible multicomponent fluid structure interaction problem. Journal de Mathematiques Pures et Appliquees. 2024, 184(April), 118-189. DOI: 10.1016/j.matpur.2024.02.007
In this article, we analyze a system of PDEs governing the interaction between two compressible mutually noninteracting fluids and a shell of Koiter type encompassing a time dependent 3D domain filled by the fluids. The dynamics of the fluids is modelled by a system resembling compressible Navier-Stokes equations with a physically realistic pressure depending on densities of both the fluids.The shell constitutes the boundary of the fluid domain and it possesses a non-linear, non-convex Koiter energy (of a quite general form). We are interested in the existence of a weak solution to the system until the time-dependent boundary approaches a self-intersection or the Koiter energy degenerates. The generalization and extension of Lions- Feireisl methods to the case of moving domain with structure is shown.

[8] **Positselski, L.**, Šťovíček, J. Coderived and contraderived categories of locally presentable abelian DG-categories. Mathematische Zeitschrift. 2024 308(1), Article ID 14. DOI: 10.1007/s00209-024-03519-3
This paper unifies two classical areas of homological algebra, namely DG-modules and Abelian categories, into a single theory of Abelian DG-categories. Previous results in the theory of derived categories of the second kind are strengthened and extended in this new framework, while also including the popular topic of quasi-coherent matrix factorizations..

[9] Bisconti, L., **Caggio, M.** Inviscid limit for the compressible Navier-Stokes equations with density dependent viscosity. Journal of Differential Equations. 2024, 390(May), 370-425. DOI: 10.1016/j.jde.2024.01.045
We consider the compressible Navier-Stokes system describing the motion of a barotropic fluid with density dependent viscosity confined in a three-dimensional bounded domain Ω. We show the convergence of the weak solution to the compressible Navier-Stokes system to the strong solution to the compressible Euler system when the viscosity and the damping coefficients tend to zero.

[10] Thomas, S., Carson, E., **Rozložník, M.**, Carr, A., Świrydowicz, K. Iterated Gauss–Seidel GMRES. SIAM Journal on Scientific Computing. 2024, 46(2), S254-S279. DOI: 10.1137/22M1491241
We present an iterated Gaussâ€“Seidel formulation of the GMRES algorithm based on the ideas of Ruhe on equivalence between iterated Gram-Schmidt process and Gauss-Seidel method. Depending on the number of Gauss-Seidel iterations, we derive corresponding GMRES algorithm that maintains the required level of orthogonality between the computed vectors. In addition, we show that GMRES can be implemented with only a single synchronization point per iteration, making it relevant to large-scale parallel computing environments.

[11] **Ortaggio, M.**, **Pravda, V.**, **Pravdová, A.** Kerr-Schild double copy for Kundt spacetimes of any dimension. Journal of High Energy Physics. 2024, 2024(2), Article ID 69. DOI: 10.1007/JHEP02(2024)069
The so-called double copy shows that in some special cases Einstein's gravitational equations are equivalent to Maxwell's equations of electromagnetism in a well-defined sense. In this paper we show that this equivalence holds for all Kundt spacetimes of type N in any dimension. We also discuss the possible ambiguity of this duality.

[12] **Müller, V.**, Tomilov, Y. Matrix representations of arbitrary bounded operators on Hilbert spaces. Journal für die Reine und Angewandte Mathematik. 2024, 808, 111-141. DOI: 10.1515/crelle-2023-0095
We show that under natural and quite general assumptions, a large part of a matrix for a bounded linear operator on a Hilbert space can be preassigned. The result is obtained in a more general setting of operator tuples leading to interesting consequences, e.g., when the tuple consists of powers of a single operator. We also prove several variants of this result of independent interest. The paper substantially extends former research on matrix representations in infinite-dimensional spaces dealing mainly with prescribing the main diagonals.

[13] **Hrubeš, P.** A subquadratic upper bound on sum-of-squares composition formulas. 39th Computational Complexity Conference (CCC 2024). Dagstuhl: Schloss Dagstuhl, Leibniz-Zentrum für Informatik, 2024, Article ID 12. Leibniz International Proceedings in Informatics, 300. ISBN 978-3-95977-331-7. DOI: 10.4230/LIPIcs.CCC.2024.12
The paper explores the classic Hurwitz problem on the sum of squares. It gives a new construction of identities between sums of squares, and the first one that has subquadratic magnitude.

2.5 Projects

2 European projects funded by European Research Executive Agency)

- Horizon Europe, MSCA DN, CaLiForNIA Cartan and differential geometry, Lie theory, quantum groups and non commutative geometry For novel and Innovative Applications to quantum algorithms and geometric deep learning (2024–2027, K. Strung)
- Horizon Europe, MSCA PF, EXCICO Extremal Combinatorics and Circuit Complexity (2024, N.Talebanfard)

2 projects Praemium Academiae funded by the Czech Academy of Sciences

- Operadic categories and their applications (2019–2024, M. Markl)
- Fluid-structure interaction problems: mathematical analysis and applications (2022–2027, Š. Nečasová).

2 grant projects for the support of excellence in basic research EXPRO funded by the Czech Science Foundation:

- 20-31529X Abstract convergence schemes and their complexities (2020–2024, W. Kubiś)
- 19-27871X Efficient approximation algorithms and circuit complexity (2019–2023, P. Hrubeš)

8 standard grant projects funded by the Czech Science Foundation:

- 24-11034S Dissipative systems in fluid dynamics (2024–2026, E. Feireisl)
- 24-10586S Analytical and numerical modeling of hysteresis phenomena (2024–2026, M. Křížek)
- 23-04683S Compactness in set theory, with applications to algebra and graph theory (2023–2025, C. Lambie-Hanson)
- 23-04720S Fine properties of functions, operators and function spaces (2023–2025, A. Gogatishvili)
- 23-04825S Logic and unsatisfiability (2023–2025, N. Thapen)
- 23-05148S Homological and structural theory in geometric contexts (2023–2025, L. Positselski)
- 23-06159S Vortical structures: advanced identification and efficient numerical simulation (2023–2025, J. Šístek)
- 22-01591S Mathematical theory and numerical analysis for equations of viscous newtonian compressible fluids (2022–2024, Š. Nečasová)

1 international grant projects evaluated on the basis of the LEAD Agency principle funded by the Czech Science Foundation

- 22-07833K Homogeneity and Genericity of Metric Structures - Groups, Dynamical Systems, Banach Spaces and C*-Algebras (2022-2024, Bice)

1 project in the project MSTC Danube funded by the Ministry of Education, Youth and Sports:

- 8X23001 Mathematical investigation of hysteresis in material modeling (2023–2025, G. Monteiro)

A detailed information on the projects is available at the Institute's web site http://www.math.cas.cz/ in the section Research / Grants.

2.6 International conferences and workshops organized by the Institute

Winter School in Abstract Analysis 2024, section Set Theory & Topology, Hejnice, 27.1. - 2. 2. 2024, https://winterschool.eu/2024

EVEQ 2024, NextGen 17. 6. – 21. 6. 2024, https://eveq.math.cas.cz/

Programs and algorithms of numerical mathematics 22, Hejnice, 23. 6. - 28. 6. 2024, https://panm22.math.cas.cz/

Czech-Georgian Workshop on Boundary Value Problems, Brno, 2. - 4. 7. 2024, https://czge.math.cas.cz/

Mathematical Fluid Mechanics In 2024, Praha, 19. – 23. 8. 2024, https://mfm-in.com/

Cosmology on small scales 2024, Praha Modrá posluchárna, 19. – 21. 9. 2024, https://css2024.math.cas.cz/

Triangulated categories in algebra and geometry, Praha, 23. 9. – 27. 9. 2024, https://sites.google.com/view/triang-cats-algebra-geometry/home

Higher Structures in Prague, Praha, 14. – 18. 10. 2024, https://workshop.math.cas.cz/higher-structures-in-prague/

Workshop with the Kanazawa University group, Praha, 26. 11. 2024, https://www.math.cas.cz/public/storage/conferences/program_mg0Cs7.blob.pdf

(Non)local (non)linear Workshop I in Prague, Praha, 26. - 28. 11. 2024, https://www.uni-bielefeld.de/fakultaeten/mathematik/ag/numerik/workshop/prague24/

Fifth European Physical Society Conference on Gravitation: Unlocking Gravity Through Computation, Praha, 9. – 11. 12. 2024, https://indico.imapp.ru.nl/event/248/

2.7 International collaboration

An extensive international collaboration in 2024 is documented by the following facts:

- 76 visitors to the Institute
- 107 talks and 4 poster presentations including 56 invited talks
- 11 international conferences and national meetings organized or co-organized by the Institute
- 61 memberships in editorial boards of international scholarly journals

The Institute is a corporate member of the following organizations:

- The Union of Czech Mathematicians and Physicists
- The European Mathematical Society
- ERCOM (European Research Centres on Mathematics)
- European Digital Mathematics Library Initiative
- EU-MATHS-IN (European Service Network of Mathematics For Industry and Innovation) – through the national network EU-MATHS-IN.CZ
- ERCOFTAC a global association of research, education, and industry groups, supporting joint efforts of Research Institutes and Industries who are active in all aspects of Flow, Turbulence and Combustion.

2.8 Cooperation with universities in education

Members of the Institute held a number of courses for students at Czech and foreign universities, supervised 37 PhD students. The Institute is accredited for 16 PhD programmes jointly with the Charles University and the University of West Bohemia.

PhD students trained in the Institute in cooperation with the universities:

Azhar Abek, L. U. Gumilov Eurasian National University, consultant A. Gogatishvili
Juraj Belohorec, Charles University, supervisor P. Hubáček
Martin Boroš, Charles University, supervisor M. Hrbek
Jaroslav Bradík, Silesian university in Opava, supervisor M. Engliš
Zadira Ermiashova, L. U. Gumilov Eurasian National University, consultant A. Gogatishvili
Lukáš Folwarczný, Charles University, supervisor P. Pudlák
Petr Gális, Czech Technical University, supervisor J. Mikyška
Aaron Kettner, Charles University, consultan K. Strung
David Kokoška, Charles University, supervisor M. Ortaggio
Filip Konopka, Charles University, supervisor M. Tvrdý
Nurgul Kuzeubaeva, L. U. Gumilov Eurasian National University, consultant A. Gogatishvili
Anna Lancmanová, Czech Technical University, supervisor T. Bodnár
Tereza Lehečková, Czech Technical University, supervisor M. Ortaggio
Daniel Negreiros Lobo, Charles University, supervisor A. Zvonareva
Soughata Mahanta, West Bohemia University in Pilsen, supervisor Š. Nečasová
Natalia Maślany, Uniwersytet Jagielloński, Krakow, supervisor T. Kania
Kristýna Mašková, Charles University, supervisor P. Hubáček
David Matejov, Charles University, supervisor I. Khavkine
Matouš Menčík Charles University, supervisor C. Lambie-Hanson
Adam Morawski, Charles University, supervisor D. Chodounský
Josef Musil, Czech Technical University, cosupervisor J. Šístek
Akhila Nelliyamkunnath Satheesan, Charles University, supervisor K. Strung
Mariusz Niwiński, Jagiellonian University Krakow, supervisor T. Kania
Ani Ozbetelashvili, I. Javakhishvili Tbilisi State University, supervisor A. Gogatishvili
Simone Pizzirani, Charles University, supervisor M. Hrbek
Paulina Radecka, Uniwersytet S. Wyszynskiego, Warszawa, supervisor W. Kubiś
Ana Radošević, University of Zagreb, supervisor Š. Nečasová
Tomáš Raunig, rles University, supervisor M. Doucha
Jan Scherz, Charles University and Universität Würzburg, consultant Š. Nečasová
Julia Ścislowska, Warsaw University, cosupervisor A. Bartoš
Aravindhan Srinivasan, Charles University, supervisor M. Ortaggio
Michal Stano,, Charles University, supervisor V. Pravda
Dominik Trnka, Masaryk University in Brno, Přírodovědecká fakulta, supervisor M. Markl
George Turner, Charles University, supervisor V. Pravda
Karel Vacek, Czech Technical University, supervisor P. Sváček
Jakub Večeřa, Palacký University in Olomouc, supervisor T. Masopust
Ange Zugmeyer, Charles University, supervisor M. Doucha

2.9 Awards

Š. Nečasová, included in 24 Top Women Scientists of the Czech Republic 2024, Forbes in collaboration with L'Oréal https://forbes.cz/top-ceske-vedkyne-24/.

J. Šimša, Medal of the Union of Czech Mathematicians and Physicists, Czech Mathematical Society 2024.

P. Pudlák, invited lecture at 9th European Congress of Mathematics (9ECM), Sevilla, July 15-19, 2024, https://www.ecm2024sevilla.com/index.php.

E. Khaniki, The Sacks Prize for the most outstanding doctoral dissertation in mathematical logic, together with N. Pischke, https://aslonline.org/prizes-and-awards/

N. Thapen, The award for best paper at the conference SAT 2024 (The 27th International Conference on Theory and Applications of Satisfiability Testing), http://satisfiability.org/SAT24/awards.php

2.10 Further activities

The prestigious annual **Eduard Čech Lecture** devoted to the memory of the eminent Czech mathematician and founder of the Institute was created to attract excellent foreign mathematicians and to further stimulate creative environment at the Institute. The twentieth Eduard Čech Distinguished Visitor of the Institute of Mathematics was Samuel Buss (University of San Diego).

The Institute organized traditional Open Houses as a part of the scientific festival Week of Czech Academy of Sciences. According to our statistics from Novenber 4 to November 8, 2024, in total 1590 high-school students and other visitors watched 38 lectures and attended 17 workshops.

The Institute continued in providing professional and financial support to the Mathematical Olympiad, particularly in preparation of the national representatives to the International Mathematical Olympiad.

3 Economic management

3.1 Assets

The Institute owns the estate, parcel no. 2120, and the building, house no. 609/25, on that land. Total area of residential and non-residential premises is 3,341 square metres. Part of the ground floor in the front building of 64 square metres is leased for commercial purpose; further two rooms and one storeroom are leased for non-commercial purpose to the Union of Czech Mathematicians and Physicists. In the rear building there are five flats leased mostly to employees of the Institute. All other spaces in both buildings (2,836 square metres in total) are used for the purpose of the Institute.

The book value of the compound to the day of 31 December 2024 was 43 868 thousand CZK, its remaining book value was 17 644 thousand CZK.

Further tangible fixed assets is formed mostly by devices and IT equipment with the book value 8 885 thousand CZK to the date 31 December 2024, remaining book value was 1 143113932 thousand CZK.

3.2 Expenses and revenues

Principal entries (in thousands of CZK)

Total expenses	**113,932**
Purchases of materials, electricity, gas	3,694
Maintenance and reconstructions	402
Travel expenses	4,240
Other services	7,264
Personal expenses	95,796
Other expenses	854
Depreciation	1,457
Total revenues	**113,932**
Sales of periodicals	2,691
Other revenues	3,268
Institutional subsidies (from the budget of the Czech Academy of Sciences)	81,249
Grants	26,723
Earnings before taxes	**0**

The total revenues compared to the year 2023, decreased by 1.6%. This was mainly due to the decrease of grant sources provided mainly by the Czech Science Foundation and Ministry of Education, Youth, and Sports.

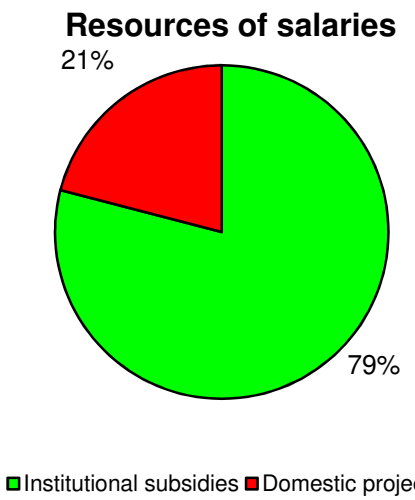
3.3 Personnel and salaries

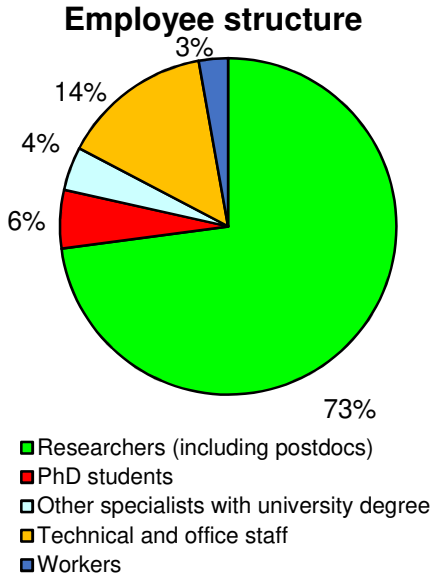
The average number of employees amounted to 90.74 FTE (96.71 FTE in previous year).

The personnel expenses of 95 796 thousand CZK represented 84,1% of total operating expenses.

The average monthly salary from all resources – institutional, project and commercial – was 63,244 CZK. This represents a nominal increase compared to the previous year on the level of six percent.

During 2024, 15 vacancies (2 research fellows, 6 postdocs, 5 Ph.D. students, 2 administration) were filled, with exception of research fellow and administration positions mostly for two-year contracts. 5 researchers, 8 postdocs, 6 Ph.D. students and 2 administration workers terminated employment in 2024.





In line with the general approach of the Czech Academy of Sciences, research staff in the Institute is employed on fixed-term contracts and recruited in open competitions advertised at the Institute's web site and at the job server of the European Mathematical Society. Applicants are directed to the web site with detailed information and to the specialised web system for submitting applications and reference letters (https://application.math.cas.cz/Positions.html). The system enables a preliminary remote discussion of the heads of departments and of the selection committee members and facilitates the subsequent assessment of applications.

Doc. Dr. Ing.. Miroslav Rozložník, DSc.
Director