Gleb Pogudin

Contact Information

Affiliation **LIX, CNRS, École Polytechnique**, *Institut Polytechnique de Paris*.

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Employment

2020–now **Assistant Professor**, *École Polytechnique*, France.
Laboratoire d'informatique

2019–2020 **Assistant Professor**, *Higher School of Economics*, Moscow.
Department of Computer Science

2017–2019 **Assistant Professor/Faculty Fellow**, *New York University*.
Courant Institute of Mathematical Sciences

2017–2019 **Visiting Scholar**, *City University of New York*.
Graduate Center

2016–2017 **Postdoc**, *Johannes Kepler University*, Linz, Austria.
Institut für Algebra, mentored by Manuel Kauers

2012–2016 **Math Instructor**, *Moscow State University*.
Department of Mechanics and Mathematics and A.N.Kolmogorov high school

2014–2016 **Math Instructor**, *College of Moscow Institute of Physics and Technology*.

2012–2013 **Programmer**, *Yandex Company*.
Banner System: Real-time computations and Data Analysis

Education

2012–2016 **Ph.D. in Mathematics**, *Moscow State University*.
Advisor: Yu. P. Razmyslov

2007–2012 **Diploma in Mathematics and Applied Mathematics**, *Moscow State University*.
Advisor: Yu. P. Razmyslov. Diploma with honours.

Grants

2021-2022 **Réseau Francilien en Sciences Informatiques (RFSI)**.
"*Exact ODE Reduction*"

2019 **National Science Foundation**, *Mathematical Biology*.
"*Efficient Methods for Identifiability of Dynamic Models*"

Publications

Preprints

1. A. Ovchinnikov, A. Pillay, G. Pogudin, T. Scanlon, *Multi-experiment parameter identifiability of ODEs and model theory*, `https://arxiv.org/abs/2011.10868`.
2. I. C. Pérez Verona, A. Ovchinnikov, G. Pogudin, M. Tribastone, *CLUE: Exact maximal reduction of kinetic models by constrained lumping of differential equations*, `https://arxiv.org/abs/2004.11961`.
3. W. Li, A. Ovchinnikov, G. Pogudin, T. Scanlon, *Algorithms yield upper bounds in differential algebra*, `https://arxiv.org/abs/2005.01608`.
4. A. Ovchinnikov, A. Pillay, G. Pogudin, T. Scanlon, *Computing all identifiable functions for ODE models*, `https://arxiv.org/abs/2004.07774`.
5. E. Amzallag, A. Minchenko, G. Pogudin, *Degree bound for toric envelope of a linear algebraic group*, `https://arxiv.org/abs/1809.06489`.
6. A. Ovchinnikov, G. Pogudin, P. Thompson, *Input-output equations and identifiability of linear ODE models*, `https://arxiv.org/abs/1910.03960`.
7. A. Ovchinnikov, G. Pogudin, P. Thompson, *Parameter identifiability and input-output equations*, `https://arxiv.org/abs/2007.14787`.

Peer-reviewed articles

1. A. Ovchinnikov, G. Pogudin, N. Thieu Vo, *Bounds for elimination of unknowns in systems of differential-algebraic equations*, Accepted for publication in International Mathematics Research Notices, 2020.
2. W. Li, A. Ovchinnikov, G. Pogudin, T. Scanlon, *Elimination of unknowns for systems of algebraic differential-difference equations*, Transactions of American Mathematical Society, doi:10.1090/tran/8219, 2020.
3. M. Buchacher, M. Kauers, G. Pogudin, *Separating variables in bivariate polynomial ideals*, refereed Proceedings of the 2018 ACM International Symposium on Symbolic and Algebraic Computation, pp. 54–61, 2020.
4. H. Hong, A. Ovchinnikov, G. Pogudin, C. Yap, *Global identifiability of differential models*, Communications in Pure and Applied Mathematics, vol. 73(9), pp. 1831–1879, 2020.
5. G. Pogudin, T. Scanlon, M. Wibmer, *Solving difference equations in sequences: Universality and Undecidability*, Forum of Mathematics, Sigma, vol. 8, e33, 2020.
6. A. Ovchinnikov, G. Pogudin, T. Scanlon, *Effective difference elimination and Nullstellensatz*, accepted for publication in the Journal of the European Mathematical Society, 2020.
7. E. Paul, G. Pogudin, W. Qin, R. Laubenbacher *The dynamics of canalizing Boolean networks*, Complexity, vol 2020, ID3687961, 2020.
8. G. Pogudin, *Primitive element theorem for fields with commuting derivations and automorphisms*, Selecta Mathematica, 25:57, 2019.
9. H. Hong, A. Ovchinnikov, G. Pogudin, C.Yap, *SIAN: software for structural identifiability analysis of ODE models*, Bioinformatics, vol. 35(16), pp. 2873–2874, 2019.

10. E. Amzallag, G. Pogudin, M. Sun, N. Thieu Vo, *Complexity of triangular representations of algebraic sets*, Journal of Algebra, vol. 523, pp. 342-364, 2019.
11. G. Pogudin, *A differential analog of the Noether normalization lemma*, International Mathematics Research Notices, vol. 2018(4), pp. 1177–1199, 2018.
12. G. Pogudin, A. Szanto, *Irrendundant Triangular Decomposition*, refereed Proceedings of the 2018 ACM International Symposium on Symbolic and Algebraic Computation, pp. 311–318, 2018.
13. G. Pogudin, *Products of ideals and jet schemes*, Journal of Algebra, vol. 502, pp. 61–78, 2018.
14. R. Gustavson, A. Ovchinnikov, G. Pogudin, *New order bounds in differential elimination algorithms*, Journal of Symbolic Computation, vol. 85, pp. 128–147, 2018.
15. G. Pogudin, *Power series expansions for the planar monomer-dimer problem*, Physical Review E, vol. 96, 033303, 2017.
16. M. Kauers, G. Pogudin, *Bounds for Substituting Algebraic Functions into D-finite Functions*, refereed Proceedings of the 2017 ACM International Symposium on Symbolic and Algebraic Computation, pp. 245–252, 2017.
17. O. Gerasimova, Yu.P. Razmyslov, G. Pogudin *Rolling Simplexes and Their Commensurability III (Capelli Identities and Their Application to Differential Algebras)*, Journal of Mathematical Sciences, vol. 221(3), pp. 315–325, 2017.
18. G. Pogudin, Yu.P. Razmyslov, *Prime Lie algebras satisfying the standard Lie identity of degree 5*, Journal of Algebra, vol. 468, pp. 182–192, 2016.
19. R. Gustavson, A. Ovchinnikov, G. Pogudin, *Bounds for orders of derivatives in differential elimination algorithms*, refereed Proceedings of the 2016 ACM International Symposium on Symbolic and Algebraic Computation, pp. 239–246, 2016.
20. E.S. Golod, G. Pogudin, *Modules of zero Gorenstein dimension over graph algebras*, Sbornik:Mathematics, vol. 207, issue 7, pp. 81–100, 2016.
21. G. Pogudin, *The primitive element theorem for differential fields with zero derivation on the base field*, Journal of Pure and Applied Algebra, vol 219(9), pp. 4035–4041, 2015.
22. G. Pogudin, *Primary differential nil-algebras do exist*, Moscow University Mathematics Bulletin, vol 69(1), pp 33–36, 2014.
23. Yu.P. Razmyslov, G. Pogudin, *The Heisenberg envelope for the Hochschild algebra of a finite-dimensional Lie algebra*, Journal of Mathematical Sciences, vol. 193(4), pp 580–585, 2013.
24. Yu.P. Razmuslov, G. Pogudin, *Paradigm of Max-Factor and finite-dimensional representation of Lie algebras*, Moscow University Mathematics Bulletin, vol. 67(4), pp 170–172, 2012.
25. G. Pogudin, *Wronskian of derivations*, Moscow University Mathematics Bulletin, Volume 66(1), pp 47–49, 2011.

Other publications

1. M. Drmota, C. Krattenthaler, G. Pogudin, *Problem 11997*, The American Mathematical Monthly, vol. 124, number 7, p.660.

Recent presentations

1. *Structural parameter identifiability with a view towards model theory*, workshop "Model Theory of Differential Equations, Algebraic Geometry, and their Applications to Modeling" organized online by Banff International Research Station, 1-5 June 2020.
2. *SIAN: a tool for assessing structural identifiability of parametric ODEs*, International Symposium on Symbolic and Algebraic Computation (ISSAC), Beijing, 15-18 July 2019.
3. *Parameter identifiability for ODE models via an input-output representation* (poster), SIAM Applied Algebraic Geometry, Bern, 9-13 July 2019 (Best poster award).
4. *Primitive Element Theorem for fields with derivations and automorphisms*, Applications of the model theory of fields with operators, Manchester, 17-20 June 2019.
5. *Global identifiability of differential models*, Biomathematics/Computational Biology Colloquium, Courant Institute of Mathematical Sciences, October 23 2018.
6. *Elimination of unknowns in systems of difference equations*, Differential Algebra and Related Topics IX, Leeds, 30 July - 2 August 2018.
7. *Global identifiability of differential models*, International Congress on Mathematical Software (ICMS), South Bend, 23-27 July 2018.
8. *Irredundant triangular decomposition*, International Symposium on Symbolic and Algebraic Computation (ISSAC), New York, 16-19 July 2018.
9. *Power series expansion of the free energy for monomer-dimer tilings*, Rutgers Experimental Mathematics Seminar, New Brunswick, 1 February 2018.
10. *Algorithms for checking global identifiability*, Kolchin Seminar in Differential Algebra, CUNY Graduate Center, New York, 1 September 2017.
11. *Computation of a representation of radical ideal via triangular sets*, SIAM Applied Algebraic Geometry, Atlanta, 1-4 August 2017.
12. *Elimination for systems of nonlinear ODEs arising in biology*, Annual Meeting of Society for Mathematical Biology, Salt Lake City, 17-20 July 2017.

Teaching

- École Polytechnique:
  - Computer Programming (CSE101 and CSE102, lab sessions),
  - Concurrent and Distributed Computing (CSE305, lab sessions).
- Higher School of Economics:
  - Algorithms and Data Structures 1,
  - Computations in Nonlinear Algebra.
- New York University: Basic Algorithms (4 semesters).
- New York Math Circle: "College Bridge" program.
- Johannes Kepler University: Algebra for Computer Scientists, project leader for "Project Week of Applied Mathematics" (link).

- Moscow State University, Department of Mechanics and Mathematics: Abstract Algebra I, II, Ring theory.
- Moscow State University, A.N. Kolmogorov school: Calculus I, II, Intermediate Algebra.
- College of Moscow Institute of Physics and Technology: Discrete Mathematics, Probability and Statistics.

Teaching awards

2015, 2016 The Best Teacher of the A.N. Kolmogorov High School (Moscow State University).

2014 Grant recipient of the Education Department of Moscow.

Mentoring students

2020 Internship "*Global identifiability of differential models*" by Ruiwen Dong, École Polytechnique (joint with Heather Harrington). Received "Prix du centre de recherche" from École Polytechnique.

2019-2020 Master thesis "*Representing Tropical Rational Functions via ReLU Neural Networks*" by Anton Zakharenkov, Higher School of Economics, Moscow.

2019-2020 Bachelor thesis "*Monomial quadratization of ODEs*" by Andrey Bychkov, Higher School of Economics, Moscow.

2019-2020 Project "*Parameters of Quadratization of Scalar Polynomial ODE's*" by Foyez Alauddin (high school student). Received High Honors at the New York State Science and Engineering Fair and Best in Mathematics and Computer Science at the Delbarton Science Fair.

2018-2019 Project "*The Dynamics of Canalizing Boolean Networks*" by Eli Paul and William Qin (high school students). The paper we wrote is available at `https://arxiv.org/abs/1902.00056`.

2017-2018 Project "*A method for identifying parameters in the May-Leonard system using Gröbner bases*" by Esha Sawant (high school student). The project advanced to the finals of the NYC Science and Engineering Fair.

Professional service

- Program Committee Member of Computer Algebra in Scientific Computing (CASC 2020, Linz, Austria).
- Co-organizer of the workshop Model Theory of Differential Equations, Algebraic Geometry, and their Applications to Modeling (2020, BIRS, Canada)
- Program Committee Member of the 44th International Symposium on Symbolic and Algebraic Computation (ISSAC 2019, Beijing, China).
- Chair of the Workshop on Symbolic-Numeric Methods for Differential Equations and Applications (NYU, USA, 2018).
- Selection Committee Member for Dean's Undergraduate Research Fund (NYU, USA, 2018).
- Judge of the NYU Undergraduate Research Conference (NYU, USA, 2018).

- Publicity Chair of the 43rd International Symposium on Symbolic and Algebraic Computation (ISSAC 2018, CUNY and NYU).
- Poster Committee Member of the 43rd International Symposium on Symbolic and Algebraic Computation (ISSAC 2018, CUNY and NYU).
- Local Organizer of the 8th Differential Algebra and Related Topics conference (Johannes Kepler University, Linz, Austria, 2017).

Additional skills

Programming languages: C++, Python, Julia, Perl, Maple, Mathematica, Java, SQL, Coq.