

**Dr. DMITRY PONOMAREV**

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**Google Scholar profile:** <https://scholar.google.com/citations?user=kqwB1ykAAAAJ&hl>

**Reference contacts:**

- Laurent Bourgeois ([laurent.bourgeois@ensta-paristech.fr](mailto:laurent.bourgeois@ensta-paristech.fr)), postdoc advisor and collaborator;
- Eduardo Andrade Lima ([limaea@mit.edu](mailto:limaea@mit.edu)), collaborator;
- Stanislas Kupin ([stanislas.kupin@math.u-bordeaux.fr](mailto:stanislas.kupin@math.u-bordeaux.fr)), collaborator;
- Juliette Leblond ([juliette.leblond@inria.fr](mailto:juliette.leblond@inria.fr)), PhD thesis advisor and collaborator;
- Laurent Baratchart ([laurent.baratchart@inria.fr](mailto:laurent.baratchart@inria.fr)), PhD thesis advisor and collaborator;
- Dmitry Pelinovsky ([dmpeli@math.mcmaster.ca](mailto:dmpeli@math.mcmaster.ca)), MSc thesis advisor and collaborator;
- Sergey Leble ([leble@mif.pg.gda.pl](mailto:leble@mif.pg.gda.pl)), MSc thesis advisor and collaborator;
- Victorita Dolean ([victorita.dolean@strath.ac.uk](mailto:victorita.dolean@strath.ac.uk)), internship project advisor;
- Stéphane Lanteri ([stephane.lanteri@inria.fr](mailto:stephane.lanteri@inria.fr)), internship project advisor;
- Oleg Nagornov ([nagornov@yandex.ru](mailto:nagornov@yandex.ru)), diploma project advisor and collaborator.

**Research keywords:**

*Applied mathematics, asymptotic analysis, model justification, inverse problems (static and dynamic obstacle identification, inverse magnetization problem), integral and integro-differential equations, partial data problems (e.g. Cauchy problem for elliptic PDEs), nonlinear wave propagation, approximation theory (approximation by traces of analytic functions), optimal bases construction (spectral theory for convolution operators), complex-analytic methods (e.g. Riemann-Hilbert problems).*

**Academic work experience:**

1. Dec. 2018 – Dec. 2021: Institute for Analysis and Scientific Computing , TU Vienna – post-doctoral fellow.
2. Oct. 2016 – Dec. 2018: POEMS laboratory, ENSTA ParisTech – post-doctoral fellow.
3. Oct. 2012 – Jun. 2016: INRIA Méditerranée, APICS research team – Ph.D.
4. Sep. 2010 – May 2012: McMaster University, Mathematics and Statistics department – teaching and research assistant.
5. Sep. 2010 – May 2012: McMaster University – physics, mathematics private tutor.
6. Mar. 2006 – Feb. 2007: Lyceum 8 (Electrostal) - physics tutor (“Methods of Solving Advanced Physics Problems” course).

**Education:**

1. Oct. 2012 – Jun. 2016: Ph.D. [under supervision of Juliette Leblond and Laurent Baratchart], University of Nice – Sophia Antipolis, INRIA Méditerranée.
2. Sep. 2010 – May 2012: M.Sc. in mathematics, Department of Mathematics and Statistics, McMaster University [M.Sc. thesis under supervision of Dmitry Pelinovsky].
3. Sep. 2008 – Jul. 2010: MathMods - Mathematical Modeling in Engineering: Theory, Numerics, Applications [*graduated with honors*] - international M.Sc. program organized and funded by the European Commission:

- *Sep. 2008 – Feb. 2009*: Theoretical module - University of L'Aquila, Italy.
  - *Feb. 2009 – Aug. 2009*: Numerics - University of Nice - Sophia Antipolis, France.
  - *Aug. 2009 – Aug. 2010*: Applications (“Advanced computational methods in material science” track) and M.Sc. Thesis [under supervision of Sergey Leble] – Gdansk University of Technology, Poland.
4. *Sep. 2002 – Feb. 2008*:  
National Research Nuclear University MEPhI (formerly Moscow Engineering Physics Institute, State University), the Faculty of Theoretical and Experimental Physics, the Department of Modeling of Physical Processes in Environment [diploma work under supervision of Oleg Nagornov].
  5. *Sep. 2001 – Jun. 2002*:  
MIPT (Moscow Institute of Physics and Technology, State University) Correspondence School of Physics and Mathematics.

#### **Industrial projects / internships:**

- *June 2012 – Aug. 2012*: INRIA (APICS team), Sophia Antipolis, France – pre-doctoral summer project [under supervision of Juliette Leblond and Laurent Baratchart].
- *May 2009 – Aug. 2009*: INRIA (NACHOS team), Sophia Antipolis, France – industrial training / internship [under supervision of Stéphane Lanteri, Victorita Dolean and Stéphane Descombes].

#### **Awards, fellowships and grants:**

1. *2012* – École Doctorale STIC (Sciences & Technologies de l'Information et de la Communication) grant for 3-year Ph.D. studies.
2. *2010-2012* – McMaster University graduate school scholarship.
3. *2008-2010* – Erasmus Mundus study grant and scholarship by the European Commission for participating in the two-year international MathMods program awarded on highly competitive basis.
4. *2008* – Russian national grant for a developer of MEPhI nano-modeling portal.
5. *2007* – special MEPhI award for scientific work in modeling of dynamic inflation of a volcanic chamber.
6. *2003-2008* – set of 7 regular and 3 special (for only “excellent” grades in a semester) MEPhI scholarships.
7. *2001-2003* – number of diplomas in physics, mathematics and computer science for successful high-school competitions on a regional level.

#### **Publications / preprints:**

1. J. Leblond, L. Baratchart, D. Ponomarev, “Solution of a homogeneous version of Love type integral equation in different asymptotic regimes” [ *accepted in IMSE 2018 Proceedings* ], October 2018.
2. L. Bourgeois, J. Dardé, D. Ponomarev, “An inverse obstacle problem for the wave equation in a finite time domain” [ *accepted in Inverse Problems and Imaging* ], September 2018.
3. L. Baratchart, J. Leblond, E. Lima, D. Ponomarev, “Magnetization moment recovery using Kelvin transformation and Fourier analysis”, *Journal of Physics: Conf. Ser.*, 904, 2017.
4. J. Leblond, D. Ponomarev, “On some extremal problems for analytic functions with constraints on real or imaginary parts”, *Advances in Complex Analysis and Operator Theory* [Festschrift in Honor of Daniel Alpay’s 60th Birthday], 219-236, 2017.
5. J. Leblond, D. Ponomarev, “Recovery of analytic functions with prescribed pointwise values on the disk from partial boundary data”, *J. Inverse Ill-Posed Probl.*, 25 (2), 2017.
6. L. Baratchart, J. Leblond, D. Ponomarev “Constrained optimization in classes of analytic functions with prescribed pointwise values”, arXiv preprint [ <http://arxiv.org/abs/1401.7633> ], July 2014.
7. D. Pelinovsky, D. Ponomarev, “Justification of a nonlinear Schrödinger model for laser beams in photopolymers”, *Z. Angew. Math. Phys. (ZAMP)*, 65, 405-433, 2014.

8. Dmitry V. Ponomarev, Sergey B. Leble, “Molecular zero-range potential method and its application to cyclic structures”, arXiv preprint [ <http://arxiv.org/abs/1101.0439> ], January 2011.
9. S. Leble, D. Ponomarev, “Dressing of zero-range potentials into realistic molecular potentials of finite range”, *Task Quarterly*, 14, 29-34, 2010.
10. D. Ponomarev, O. Nagornov, “On effective wave propagation characteristics in porous fluid-saturated medium containing fluid inclusions”, *Geophys. J. Int.*, 182 (2), 1043-1057, 2010.
11. D. Ponomarev, “High-order time integration leap-frog schemes combined with a Discontinuous Galerkin method for the solution of the Maxwell equations”, INRIA preprint [ <http://hal.inria.fr/inria-00424560/fr/> ], October 2009.
12. O. Nagornov, D. Ponomarev, “Plane wave scattering on spherical inclusions of different types in fluid-saturated porous media” [ *accepted with minor revisions in Mechanics of Solids; in Russian* ], September 2009.

### **Papers in preparation:**

1. “Spectral analysis of one-dimensional truncated Poisson operator: properties and asymptotic formulas for eigenfunctions for small and big values of a geometrical parameter” (with J. Leblond and L. Baratchart).
2. “On asymptotic extension of convolution theorem for Fourier cosine transform for certain integral equations on half-line”.
3. “New method for construction of asymptotic solution for Prandtl lifting line equation”.
4. “Recovery of magnetization features from partial field measurements: Fourier and Kelvin transforms approaches” (with J. Leblond, L. Baratchart and E. Lima).

### **Conference papers / talks / poster presentations:**

1. “Solution of a homogeneous version of the Love type integral equation in different asymptotic regimes”, IMSE 2018, Brighton, July 2018.
2. “On obstacle reconstruction for wave equation with partial data” [ *long version* ], *Waves @ Palaiseau*, Palaiseau, July 2018.
3. “On obstacle reconstruction for wave equation with partial data” [ *short version* ], *Journée de la Faculté DSIT de NewUni*, Palaiseau, June 2018.
4. “Reconstruction of obstacles from partial boundary data for wave equation with finite measurement time”, *Spring School & Workshop: Inverse Problems and Approximation Techniques in Planetary Sciences*, Sophia Antipolis, May 2018.
5. “Spectral decomposition of truncated Poisson operator”, ASPECT 2017, Trier, September 2017.
6. “Magnetization moment recovery using Kelvin transformation and Fourier analysis”, IMA Conference for Inverse Problems, Cambridge, September 2017.
7. “Magnetization features recovery based on Kelvin transformation and Fourier analysis”, NCMIP 2017 [poster presentation], April 2017.
8. “On inverse magnetization problem: magnetic moment recovery from partial measurements”, Asymptotic analysis seminar, Faculty of Mathematics and Mechanics, Moscow State University, April 2017.
9. “Spectral decomposition of truncated Poisson operator”, Séminaire d’analyse, Institut de Mathématiques de Bordeaux, March 2017.
10. “Magnetization features recovery based on Kelvin transformation and Fourier analysis”, PICOF 2016 [poster presentation], June 2016.
11. “On recovery of magnetization moments using Kelvin transformation and Fourier analysis”, Shanks workshop, Vanderbilt University, March 2016.
12. “Partially overdetermined problem for Laplace equation: taking the most from measured data while smoothing the boundary”, IFIP Conference on System Modeling and Optimization, July 2015.
13. “New methods for inverse problems of paleomagnetism”, Jean Kuntzmann laboratory, University of Grenoble, May 2015.

14. “Some inverse problems of paleomagnetism”, DEFI team seminar, École Polytechnique, November 2014.
15. “Recovery of harmonic functions from partial boundary data respecting internal pointwise values”, AIMS Conference on Dynamical Systems and Differential Equations, Madrid, July 2014.
16. “Bounded extremal problems for analytic functions with pointwise constraints”, Séminaire d’analyse et géométrie, Aix-Marseille Université, May 2014.
17. “Justification analysis for a nonlinear Schrödinger model for laser beams in photopolymers”, Waves 2013, June 2013.
18. “Equilibrium plasma shape recovery from magnetic measurements in tokamaks”, PhD event in Fusion Science and Engineering [poster presentation], October 2012.
19. “Rigorous justification analysis of an NLS approximation for the wave-Maxwell system”, APICS team seminar, INRIA, July 2012.
20. “On justification techniques for an NLS model”, AIMS lab seminar, McMaster University, October 2011.
21. “On Darboux transformations and zero-range potentials models in quantum mechanics”, AIMS lab seminar, McMaster University, March 2011.
22. “Plane wave scattering on solid, fluid and porous inclusions in fluid-saturated porous media” (with O. Nagornov), Proceedings of Moscow Engineering Physics Institute Scientific Session - 2008, January 2008.
23. “Dynamic inflation of a volcanic chamber in elastic half-space” (with O. Nagornov and S. Dunin), Proceedings of Moscow Engineering Physics Institute Scientific Session - 2007, January 2007.

#### **External projects / collaboration:**

1. *June 2013 – present:* with Eduardo Lima [Earth, Atmospheric and Planetary Sciences Department, Massachusetts Institute of Technology] – developing mathematical methods for remanent magnetization recovery from partial measurements of fields produced by magnetic rocks.
2. *June 2016 – present:* UniConcilium non-profitable start-up project [<http://www.uniconcilium.com>] – medical expert opinion aggregation platform for the Russian healthcare system.

#### **Reviewing service:**

Geophysical Journal International, AMS Mathematical Reviews.

#### **Computer skills:**

- Linux, Inkscape, Gnuplot, LyX, LaTeX.
- Programming experience: Fortran, C++, Assembler, Pascal, Perl, PHP, JavaScript, HTML, CSS.
- Mathematical and computational software: MATLAB, Maple, COMSOL Multiphysics (FEMLab), ANSYS.

**Languages:** Russian (native), English (fluent): TOEFL iBT – 103/120 (in 2009), French (intermediate).

#### **Teaching experience at McMaster University:**

1. *Spring 2012:* MATH 3D03 (“Mathematical Physics II”) – tutorials, marking.
2. *Fall 2011:* MATH 3C03 (“Mathematical Physics I”) – tutorials, marking.
3. *Fall 2011:* Participant of the informal weekly “Teaching Math” seminar.
4. *Spring 2011:* MATH 3FF3 (“Partial Differential Equations”) – tutorials, marking.
5. *Fall 2010:* MATH 3DC3 (“Discrete Dynamical Systems and Chaos”) – marking.

Teaching evaluations from students are available upon request.

#### **Summer school participation:**

1. IHP trimester on Inverse Problems (CIRM pre-school) — 2015, Marseille, France.
2. Franco-German school «Inverse Problems and PDEs» — 2013, Bremen, Germany.
3. FuseNet PhD event — 2012 (plasma physics), Pont-a-Mousson, France.
4. AARMS – 2011 (PDE analysis, harmonic analysis, mathematical biology), St. John's, Canada.
5. CoNan – 2009 (mathematical modeling in material science), Gdansk, Poland.
6. CEA-EDF-INRIA - High Performance Computing – 2009, Sophia Antipolis, France.

**Non-academic work experience:**

7. *Jul. 2006 – Aug. 2008*: SAS Institute (Moscow), Russia representative office webmaster.
8. *Oct. 1998 – May. 1999*: IntSys – Intellectual Systems (Electrostal), webmaster of local Internet service provider (unofficial job during the school period).

**Non-academic interests/hobbies:**

- web-design
- running (incl. competitive), biking, skiing
- indie-scene and music of 1950s-70s
- art-house movies, old and non-commercially oriented films