Andrey Korolkov

Research Associate, University of Manchester, UK | koriolismsu@gmail.com

🌐 Personal page | in LinkedIn | ⅋ Google scholar | R⁶ ResearchGate

RESEARCH INTERESTS

My research focuses on mathematical diffraction theory and the rigorous analysis of wave phenomena, such as acoustic and elastic scattering. I'm particularly interested in using complex analysis in 1 and 2 dimensions, integral transforms, and functional equations to tackle boundary value problems for differential and difference equations.

EDUCATION

- **M.V. Lomonosov Moscow State University**   *March 2012 - June 2016*
  PhD in Physics and Mathematics   Moscow, Russia
  ○ Thesis: New solutions to two-dimensional problems of acoustic waves diffraction by periodic gratings consisting of absorbing screens and by an impedance strip
  ○ *Supervisor: Andrey Shanin*

- **M. V. Lomonosov Moscow State University**   *September 2006 - January 2012*
  BSc + MSc in Theoretical Physics   Moscow, Russia
  ○ Thesis: Possible effects of Kaluza–Klein theory

EXPERIENCE

- **The University of Manchester [🌐]**   *October 2023 - present*
  Research associate   Manchester, UK
- **The University of Southampton [🌐]**   *July 2025 - October 2025*
  External consultant, part-time   Remote
- **M. V. Lomonosov Moscow State University [🌐]**   *March 2016 - September 2023*
  Researcher   Moscow, Russia
- **Huawei Technologies [🌐]**   *June 2022 - September 2023*
  Leading engineer, part-time   Moscow, Russia
- **A. M. Prokhorov General Physics Institute [🌐]**   *June 2017 - May 2022*
  Researcher, part-time   Moscow, Russia

SKILLS

- **Technical Skills:** MATLAB, LaTeX
- **Research Skills:** Mathematical modelling (both analytic and numeric), laboratory and field acoustic experiments, data analysis and visualisation, systematic literature review
- **Communication Skills:** Oral and written presentations, academic writing, technical reports, research collaboration, proposal writing
- **Teaching Skills:** Curriculum delivery, assessment and feedback, Supervision classes, Lecturing, student supervision (PhD, MSc, UG and foundation levels)

ACADEMIC FUNDING

- **Russian Fund for Basic Research, Co-Investigator**   *January 2018 - December 2020*
  Department of Physics, Moscow State University   £20,000
  ○ Acoustics of the circulatory system: features of signal generation for disorders of hemodynamics of the small circulation, noninvasive diagnosis of pulmonary hypertension and pathology of the vascular bed

- **Russian Scientific Foundation, Co-Investigator**   *July 2014 - December 2018*
  Department of Physics, Moscow State University   £360,000
  ○ New acoustic effects with applications to materials sciences, diagnostics and signal processing

- **Russian Fund for Basic Research, Co-Investigator**   *January 2014 - December 2016*
  Department of Physics, Moscow State University   £20,000
  ○ Development of new experimental and theoretical methods of studying of sound fields and application of these methods to the problems of room acoustics

- **The Central Aerohydrodynamic Institute Fund, Co-Investigator**   *June 2015 - October 2015*
  Department of Physics, Moscow State University   £9,000
  ○ Experimental modelling of a passenger aircraft noise screening

INDUSTRIAL FUNDING

• **Michelin, Co-Investigator**   *September 2012 - May 2022*
A. M. Prokhorov General Physics Institute   £80,000 per year
  ◦ Investigation of acoustic noise generated by vehicle tires

• **Huawei, Co-Investigator**   *September 2019 - December 2021*
Department of Physics, Moscow State University   £70,000
  ◦ Acoustic simulation and design on novel concept earphones

• **StGobain, Co-Investigator**   *November 2015 - November 2016*
Department of Physics, Moscow State University   £10,000
  ◦ Investigation of acoustic absorbing metamaterials using the perfectly matched layer method

AWARDS AND DISTINCTIONS

• **Finalist for the UKAN+ Mathematical Acoustics paper prize**   *December 2024*
UKAN+ Mathematical Analysis in Acoustics SIG   [🌐]
• **Award of Development program in the category "Outstanding articles"**   *November 2022*
Department of Physics, Moscow State University
• **Award of Development program in the category "Outstanding articles"**   *October 2017*
Department of Physics, Moscow State University
• **Competition for young scientists**   *December 2016*
Department of Physics, Moscow State University
• **ASA international student grant**   *November 2015*
Acoustical Society of America, USA

TEACHING EXPERIENCE

• **The University of Manchester**   *January 2024 - Present*
Supervision classes, project supervision
  ◦ Supervision classes on vector calculus, year 1 (2024)

  ◦ Supervision classes on probability, year 1 (2024)

  ◦ Supervision of a group project for foundation year students

  ◦ Supervision of PhD students. Including Andrew Fry (September 2025 – present) and Alice Kukurozovic (January 2026 – present), University of Manchester, Final title TBC

• **Moscow State University**   *October 2016 - September 2023*
Lecturing, supervision
  ◦ Delivered lectures and seminar for MSc and UG students.

  ◦ Supervision of MSc students and PhD students.

  ◦ Supervision of PhD students. Including Anton Laptev (2021 - 2025), Moscow State University. Preliminary thesis title: "Experimental study of ultrasound diffraction on edges and vertices of scatterers using the maximum length sequence method".

LEAD ORGANISATIONAL ROLES IN PROFESSIONAL CONFERENCES/SEMINARS

• **Co-organizer for the informal seminar of the Mathematics of Waves and Materials group**   *September 2025 - Present*
The University of Manchester   [🌐]
  ◦ Searching and inviting speakers, chairing the session

• **Co-organiser for the 'Analytical Methods in Wave Phenomena' minisymposium at the BAMC 2025**   *July 2025*
The University of Exeter   [🌐]
  ◦ Searching and inviting speakers, chairing the session

• **Co-organiser for the 'Acoustic and elastic wave scattering' minisymposium at the BAMC 2024**   *April 2024*
Newcastle University   [🌐]
  ◦ Searching and inviting speakers, chairing the session

EQUALITY, DIVERSITY AND INCLUSION

• **Maths mentoring scheme for underrepresented students**   *October 2025 – Present*
The University of Manchester   [🌐]
  ◦ Facilitating mentorship and academic support for underrepresented students

OUTREACH

• **Lecturer in the Kostroma summer school for high school students**   *July 2014, July 2015*
Kostroma region, Russia
  ◦ Delivering lectures and seminars for high school students

• **Reviewer for the Mathematical Gazette**   *December 2025 – Present*
UK   [🌐]

INVITED TALKS

- **Waves group seminar at DAMTP** *September 2025*
  Cambridge University, UK
- **UKAN+ Paper Prize Workshop** *December 2024*
  Manchester University, UK [🌐]
- **Cross-Fertilisation of ideas from the Riemann-Hilbert Technique and the Wiener-Hopf Method** *October 2024*
  Institute for Advanced Study in Mathematics in Hangzhou, China [🌐]
- **WHT Follow on: the applications, generalisation and implementation of the Wiener-Hopf Method** *July 2024*
  Isaac Newton Institute for Mathematical, University of Cambridge [🌐]
- **Singular and oscillatory integration: advances and applications** *June 2024*
  UCL, London [🌐]
- **Multimodal AI Workshop** *November 2022*
  St. Petersburg, Russia
- **Workshop on Acoustics** *October 2022*
  ITMO, St. Petersburg, Russia
- **Waves in Complex Continua (Wavinar)** *June 2020*
  ICMS online seminar [🌐]
- **Special Session ICEAA on recent developments in the parabolic equation methods** *September 2017*
  Verona, Italy
- **Seminar on wave diffraction and propagation** *November 2016*
  St. Petersburg, Russia
- **Waveguides: asymptotic methods and numerical analysis** *May 2015*
  Naples, Italy

PUBLICATIONS

[1] Shanin, A. V., Korolkov, A. I., Artemov, N. M., Assier, R. C. (2026) Matrix representation of Picard–Lefschetz–Pham theory near the real plane in $\mathbb{C}^2$. Submitted to Memoirs of the AMS

[2] Korolkov, A.I., Assier, R.C., Kisil, A.V. (2025). On an analogy between the Wiener–Hopf formulations of discrete and continuous diffraction problems. Submitted to IMA J. Appl. Math.

[3] Korolkov, A. I., Kisil, A. V. (2025). Recycling solutions of boundary value problems: the Wiener–Hopf perspective on embedding formula. In R. Soc. Open Sci. 12241782

[4] Korolkov, A.I., Laptev, A.Y., Shanin, A.V. (2024). Accounting for Viscous and Thermal Effects in Time Domain in Computational Acoustic Problems. In Acoustical Physics (Vol. 70, issue 6, pp. 1051-1057). Pleiades Publishing Ltd.

[5] Laptev, A. Y., Korolkov, A. I., Shanin, A. V. (2024). Theoretical and experimental study of diffraction by a thin cone. In Acoustical Physics (Vol. 70, issue 3, pp. 424-433), Pleiades Publishing Ltd.

[6] Shanin, A. V., Assier, R. C., Korolkov, A. I., Makarov, O. I. (2024). Double Floquet–Bloch transforms and the far-field asymptotics of Green's functions tailored to periodic structures. In Physical Review B (Vol. 110, Issue 2). American Physical Society (APS).

[7] Assier, R. C., Shanin, A. V., Korolkov, A. I. (2024). A contribution to the mathematical theory of diffraction. Part II: Recovering the far-field asymptotics of the quarter-plane problem. In Quarterly Journal of Mechanics and Applied Mathematics (Vol. 77, Issues 1-2). Oxford University Press (OUP).

[8] Shanin, A. V., Korolkov, A. I., Artemov, N. M., Assier R. C. (2024), Matrix representation of the results of Picard–Lefschetz–Pham theory near the real plane in $\mathbb{C}^2$, arXiv:2412.02481.

[9] Kniazeva, K.S., Yoshinori, S., Korolkov, A. I., Shanin, A.V. (2023). Saddle Point Method Interpretation of Transient Processes in Car Tires. (2023). In Supercomputing Frontiers and Innovations (Vol. 10, Issue 1). FSAEIHE South Ural State University (National Research University).

[10] Makarov, O. I., Shanin, A. V., Korolkov, A. I. (2023). The Sommerfeld Integral in Problems of Simulating the Diffraction of Acoustic Waves Using a Triangular Lattice. In Acoustical Physics (Vol. 69, Issue 2, pp. 143-158). Pleiades Publishing Ltd.

[11] Assier, R. C., Shanin, A. V., Korolkov, A. I. (2022). A contribution to the mathematical theory of diffraction: a note on double Fourier integrals. In The Quarterly Journal of Mechanics and Applied Mathematics (Vol. 76, Issue 1, pp. 1-47). Oxford University Press (OUP).

[12] Shanin, A. V., Korolkov, A. I., Kniazeva, K. S. (2022). Integral Representations of a Pulsed Signal in a Waveguide. In Acoustical Physics (Vol. 68, Issue 4, pp. 316-325). Pleiades Publishing Ltd.

[13] Shanin, A. V., Korolkov, A. I. (2022). Diffraction by a Dirichlet right angle on a discrete planar lattice. Quart. Appl. Math., 80, 277-315.

[14] Shanin, A. V., Korolkov, A. I., Kniazeva, K. S. (2022). Saddle Point Method for Transient Processes in Waveguides. In Journal of Theoretical and Computational Acoustics (Vol. 30, Issue 04).

[15] Korolkov, A. I., Kniazeva, K. S., Shurup, A. S. (2022). Acoustic Location Based on Triple Correlation. Bulletin of the Russian Academy of Sciences: Physics, 86(1), 70-73.

[16] Mironov, M. A., Shanin, A. V., Korolkov, A. I., Kniazeva, K. S. (2021). Transient processes in a gas/plate structure in the case of light loading. Proceedings of the Royal Society A, 477(2253), 20210530.

[17] Shanin, A. V., Korolkov, A. I. (2020). Sommerfeld-type integrals for discrete diffraction problems. Wave Motion, 97, 102606.

[18] Korolkov, A. I., Andreev, V. G., Gramovich, V. V., Aleevskaya, A. M., Martynyuk, T. V., Rudenko, O. V. (2020). Variational Method of Separation of the Aortic and Pulmonary Components of the Second Heart Sound. Doklady Physics, 65(8), 295-299.

[19] Andreev, V. G., Gramovich, V. V., Krasikova, M. V., Korolkov, A. I., Vyborov, O. N., Danilov, N. M., Rudenko, O. V. (2020). TimeFrequency Analysis of The Second Heart Sound to Assess Pulmonary Artery Pressure. Acoustical Physics, 66(5), 542-547.

[20] Korolkov, A. I., Knyazeva, K. S., Shurup, A. S. (2020). Theoretical and Experimental Studies of the Correlation Characteristics of Signals Reflected by a Rotating Propeller. Acoustical Physics, 66(6), 676-682.

[21] Korolkov, A. I., Shanin, A. V., Belous, A. A. (2019). Diffraction by an elongated Body of revolution with impedance boundaries: the boundary integral parabolic equation method. Acoustical Physics, 65(4), 340-347.

[22] Shanin, A. V., Korolkov, A. I. (2019). Diffraction by an elongated body of revolution. A boundary integral equation based on the parabolic equation. Wave Motion, 85, 176-190.

[23] Shanin, A. V., Knyazeva, K. S., Korolkov, A. I. (2018). Riemann surface of dispersion diagram of a multilayer acoustical waveguide. Wave Motion, 83, 148-172.

[24] Belous, A. A., Korolkov, A. I., Shanin, A. V. (2018). Experimental Estimation of the Frequency-Dependent Reflection Coefficient of a Sound-Absorbing Material at Oblique Incidence. Acoust. Phys., 64, 158-163.

[25] Denisov, S. L., Korolkov, A. I. (2017). Investigation of noise-shielding efficiency with the method of sequences of maximum length in application to the problems of aviation acoustics. Acoustical Physics, 63(4), 462-477.

[26] Shanin, A. V., Korolkov, A. I. (2017). Boundary Integral Equation and the Problem of Diffraction by a Curved Surface for the Parabolic Equation of Diffraction Theory. Journal of Mathematical Sciences, 226(6), 817830.

[27] Shanin, A. V., Korolkov, A. I. (2017). Diffraction of a mode close to its cut-off by a transversal screen in a planar waveguide. Wave Motion, 68, 218-241.

[28] Korolkov, A. I., Shanin, A. V. (2016). The parabolic equation method and the Fresnel approximation in the application to Weinsteins problems. Journal of Mathematical Sciences, 214(3), 302321.

[29] Korolkov, A. I., Shanin, A. V. (2016). High-frequency wave diffraction by an impedance segment at oblique incidence. Acoust. Phys., 62, 651658.

[30] Korolkov, A. I., Shanin, A. V. (2016). High-frequency plane wave diffraction by an ideal strip at oblique incidence: Parabolic equation approach. Acoust. Phys., 62(4), 405-413.

[31] Korolkov, A. I., Nazarov, S. A., Shanin, A. V. (2016). Stabilizing solutions at thresholds of the continuous spectrum and anomalous transmission of waves. ZAMM-Journal of Applied Mathematics and Mechanics/Zeitschrift Für Angewandte Mathematik Und Mechanik, 96(10), 1245-1260.

[32] Shanin, A. V., Korolkov, A. I. (2015). Diffraction by an impedance strip I. Reducing diffraction problem to RiemannHilbert problems. The Quarterly Journal of Mechanics and Applied Mathematics, 68(3), 321-339.

[33] Shanin, A. V., Korolkov, A. I. (2015). Diffraction by an impedance strip II. Solving RiemannHilbert problems by OE-equation method. The Quarterly Journal of Mechanics and Applied Mathematics, 68(3), 341-362.

[34] Korolkov, A. I., Shanin, A. V. (2015). Diffraction by a grating consisting of absorbing screens of different height. New equations. Journal of Mathematical Sciences, 206(3), 270-287.

[35] Korolkov, A. I., Shanin, A. V. (2014). Wave reflection from a diffraction grating consisting of absorbing screens: Description in terms of the Wiener-Hopf-Fock method. Acoust. Phys., 60, 624-632.

[36] Korolkov, A. I., Shanin, A. V., Aleshkin, V. M. (2014). Analysis of excitation of billiard modes in a waveguide with a swell. Technical Acoustics/Tekhnicheskaya Akustika, (5).