





Andrey Korolkov

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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
◦ Investigation of acoustic noise generated by vehicle tires £80,000 per year
- **Huawei, Co-Investigator** September 2019 - December 2021
Department of Physics, Moscow State University
◦ Acoustic simulation and design on novel concept earphones £70,000
- **StGobain, Co-Investigator** November 2015 - November 2016
Department of Physics, Moscow State University
◦ Investigation of acoustic absorbing metamaterials using the perfectly matched layer method £10,000




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), 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

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] 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.
- [2] 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
- [3] 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.
- [4] 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.
- [5] 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).
- [6] 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).
- [7] 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.
- [8] 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).
- [9] 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.
- [10] 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).
- [11] 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.
- [12] Shanin, A. V., Korolkov, A. I. (2022). Diffraction by a Dirichlet right angle on a discrete planar lattice. Quart. Appl. Math., 80, 277-315.
- [13] 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).

- [14] 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.
- [15] 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.
- [16] Shanin, A. V., Korolkov, A. I. (2020). Sommerfeld-type integrals for discrete diffraction problems. *Wave Motion*, 97, 102606.
- [17] 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.
- [18] 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.
- [19] 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.
- [20] 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.
- [21] 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.
- [22] 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.
- [23] 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.
- [24] 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.
- [25] 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.
- [26] 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.
- [27] Korolkov, A. I., Shanin, A. V. (2016). The parabolic equation method and the Fresnel approximation in the application to Weinstains problems. *Journal of Mathematical Sciences*, 214(3), 302321.
- [28] Korolkov, A. I., Shanin, A. V. (2016). High-frequency wave diffraction by an impedance segment at oblique incidence. *Acoust. Phys.*, 62, 651658.
- [29] 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.
- [30] 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.
- [31] 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.
- [32] 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.
- [33] 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.
- [34] 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.
- [35] 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).