Name	Viktor Makarichev
Position, Department/Faculty	Associate Professor, Department of Information-Communication Technologies
Academic Degree, Academic Title	PhD degree in Physics and Mathematics
Email:	v.makarichev@khai.edu
Scopus Author ID:	41761910800
Web of Science ResearcherID:	
ORCID iD:	https://orcid.org/0000-0003-1481-9132
Google Scholar:	https://scholar.google.com/citations?user=2iZZe-b0AAAAJ&hl=en
ResearchGate:	https://www.researchgate.net/profile/Victor-Makarichev-2

EDUCATION:

Basic education (university, major, year of graduation):

- V.N. Karazin Kharkiv National University, Department of Mechanics and Mathematics – Master's degree in Applied Mathematics, September 2005 – July 2006, degree with honors
- V.N. Karazin Kharkiv National University, Department of Mechanics and Mathematics – Bachelor's degree in Applied Mathematics, September 2001 – July 2005, degree with honors

Postgraduate/Doctoral studies:

- National Aerospace University "Kharkiv Aviation Institute", PhD degree in Physics and Mathematics, May 2008 – April 2011, thesis advisor: Professor V.O. Rvachov; thesis: "Application of Atomic Functions to the Theory of Generalized Taylor Series, Approximation Theory and Wavelet Theory"

Additional training, certification programs:

- Computer Vision, December 23, 2024. Link: https://lms.robotdreams.cc/certificate/a488363337358b996bbc50da74491200
- DeepLearning.AI TensorFlow: Advanced Techniques Specialization, July 14, 2024. Link: https://coursera.org/share/036571791f5188df4c7c0793f70be06c
- DeepLearning.AI course "Generative Deep Learning with TensorFlow", July 14, 2024. Link: https://coursera.org/share/8fb856bec3d9b8b9b01a3bd7b73589a6
- DeepLearning.AI course "Advanced Computer Vision with TensorFlow", June 16, 2024. Link: https://coursera.org/share/ede3081e5f30a3d073a371654df01a13
- DeepLearning.AI course "Custom and Distributed Training with TensorFlow", May 25, 2024. Link: https://coursera.org/share/15222f6a84ca9abf52d227ffabbbdbb6
- DeepLearning.AI course "Custom Models, Layers, and Loss Functions with TensorFlow", May 14, 2024. Link: https://coursera.org/share/f91461f715c84b7aeaba7dda0a813ac2
- Udemy course "Deep Learning Computer Vision™ CNN, OpenCV, YOLO, SSD & GANs", December 31, 2023. Link: https://ua.udemy.com/certificate/UC-1fa83794-f8fa-44b9-9fde-0994c153e196
- DeepLearning.AI TensorFlow Developer, August 05, 2023. Link: https://coursera.org/verify/profes-

sional-cert/CTP9X7T8T7AD

- DeepLearning.AI course “Sequences, Time Series, and Prediction”, August 05, 2023. Link: https://www.coursera.org/account/accomplishments/verify/YXMDUUCRDJZV
- DeepLearning.AI course “Natural Language Processing in TensorFlow”, August 03, 2023. Link: https://coursera.org/verify/B2YWYQMJM7X8
- DeepLearning.AI course “Convolutional Neural Networks in TensorFlow”, July 27, 2023. Link: https://www.coursera.org/account/accomplishments/verify/A3LPL2F5PRYD
- DeepLearning.AI course “Introduction to TensorFlow for Artificial Intelligence, Machine Learning, and Deep Learning”, July 11, 2023. Link: https://www.coursera.org/account/accomplishments/verify/37LQLQYWQ4JN
- DeepLearning.AI Deep Learning Specialization, December 03, 2022. Link: https://coursera.org/verify/specialization/FGHUNGKUE65B
- DeepLearning.AI course “Sequence Models”, December 03, 2022. Link: https://coursera.org/verify/4SARN6PDPLWQ
- DeepLearning.AI course “Convolutional Neural Networks”, October 30, 2022. Link: https://www.coursera.org/account/accomplishments/verify/S3L9JBUQYPH5
- DeepLearning.AI course “Structuring Machine Learning Projects”, September 04, 2022. Link: https://coursera.org/share/9996e2f7ec42ac4d5d2d9de57752b35e
- DeepLearning.AI course “Improving Deep Neural Networks: Hyperparameter Tuning, Regularization and Optimization”, August 13, 2022. Link: https://coursera.org/share/dca26ee7810cd152ee9e1a576c3b51cb
- DeepLearning.AI course“Neural Networks and Deep Learning”, August 09, 2022. Link: https://coursera.org/share/25802f098c463c7c7a0060e1b9d39eb1
- Course “Grants of Ukrainian Startup Fund”, June 11, 2022. Link: https://cases.media/cert/ncfll9
- Course “Git basics”, June 10, 2022. Link: https://testprovider.com/ru/search-certificate/TP23271254
- Course “Python Essential”, June 02, 2022. Link: https://testprovider.com/ru/search-certificate/TP32498466
- Course “Python Starter 3.8”, May 30, 2022. Link: https://testprovider.com/ru/search-certificate/TP07544990

WORK EXPERIENCE:

Professional Career (Workplace, Years, Position):

- National Aerospace University “Kharkiv Aviation Institute”, Department of Higher Mathematics – Associate Professor, Department of Information and Communication Technologies, September 2023 – now
- N.Ye. Zhukovsky National Aerospace University “Kharkiv Aviation Institute”, Department of Higher Mathematics – Doctoral Student, Department of Computer Systems, Networks and Cybersecurity, September 2021 – August 2023
- N.Ye. Zhukovsky National Aerospace University “Kharkiv Aviation Institute”, Department of Higher Mathematics – Associate Professor, Deputy Head of Department of Higher Mathematics and System Analysis, September 2015 – August 2021
- N.Ye. Zhukovsky National Aerospace University “Kharkiv Aviation Institute”, Department of Higher Mathematics – Senior Lecturer, September 2011 – September 2015
- N.Ye. Zhukovsky National Aerospace University “Kharkiv Aviation Institute”, Department of

Higher Mathematics – Assistant Professor, September 2006 - August 2011

Teaching Experience:

- **Lectures:** Calculus, Linear Algebra, Analytic Geometry, Probability Theory, Statistics, Stochastic Processes, Algorithms and Complexity Analysis, Deep Learning, Machine Learning and Data Analysis
- **Practical training:** Calculus, Linear Algebra, Analytic Geometry, Probability Theory, Statistics, Stochastic Processes, Algorithms and Complexity Analysis, Differential Equations, Deep Learning, Machine Learning and Data Analysis
- **Advised:** Bachelor's and Master's theses

Experience in International or National Projects:

- Exploratory Research on Generative Compression for Compressive Lidar, Science & Technology Center in Ukraine (STCU) Agreement No. 7116, 2024 - now
- "Methods for creating large volumes of channel images in mobile devices for basic forecasting and machine learning", 2021-2023, ДР № 0121U112176, https://nrat.ukrintei.ua/searchdoc/0224U000799
- "Methods of intelligent computer processing of big data in remote sensing, multimedia and telecommunications systems", 2018-2020, ДР № 0118U003020, https://nrat.ukrintei.ua/searchdoc/0221U104463

RESEARCH ACTIVITIES:

Main Research Areas:
Deep And Machine Learning, Convolutional Neural Networks, Atomic Functions, Image Processing, Image Compression, Image Encryption

Number of Publications (Scopus, WoS, others):
58

Monographs, Textbooks:
none

Participation in Scientific Conferences:

- Lossless Compression of HyperHeight LiDAR Forested Landscapes Data, 2025, 29th International Conference on Methods and Models in Automation and Robotics (MMAR), Międzyzdroje, Poland
- On the Classification of Digital Images Processed by the DAC Algorithm, 2024 IEEE 17th International Conference on Advanced Trends in Radioelectronics, Telecommunications and Computer Engineering (TCSET), Lviv, Ukraine
- Coding Improvement in the DAC Algorithm, The 13th IEEE International Conference on Dependable Systems, Services and Technologies, DESSERT'2023, 13-15 October, 2023, Athens, Greece
- Comparison of DAT with DCT in a Viewpoint of Current Image Processing and Analysis Trends, The 12th International Conference on Dependable Systems, Services and Technologies (DESSERT'2022), Athens, Greece December 9-11, 2022.
- A Fast Procedure for Image Lossy Compression by ADCTC Using Prediction of Distortions' MSE, ICTM 2022: Integrated Computer Technologies in Mechanical Engineering, Kharkiv, Ukraine, November 18, 2022.
- On Image Complexity in Viewpoint of Image Processing Performance, 3rd International Work-

shop on Intelligent Information Technologies & Systems of Information Security (IntelITSIS-2022), Khmelnytsky, Ukraine, May 25-27, 2022.

- Analysis of classification quality of DAT-based compression images, 16th International Conference on Advanced Trends in Radioelectronics, Telecommunications and Computer Engineering (TCSET), Lviv-Slavske, Ukraine, February 22 – 26, 2022.
- Progressive DCT-based coder and its comparison to atomic function based image lossy compression,16th International Conference on Advanced Trends in Radioelectronics, Telecommunications and Computer Engineering (TCSET), Lviv-Slavske, Ukraine, February 22 – 26, 2022.
- Classification accuracy of three-channel images compressed by discrete atomic transform, International scientific and technical conference “Integrated Computer technologies in mechanical engineering”, Kharkiv, Ukraine, October 28-29, 2021
- Lossless Discrete Atomic Compression of Full Color Digital, 2021 IEEE 16th International Conference on the Experience of Designing and Application of CAD Systems, 2021
- Application of estimates of coefficients of generalized atomic wavelets expansions to image processing, III ProfIT Conference, 2020
- On the Applications of the Special Class of Atomic Functions: Practical Aspects and Perspectives, ICTM 2020: Integrated Computer Technologies in Mechanical Engineering, 2020
- Application of Discrete Atomic Compression to Near Lossless Image Compression, 2020 IEEE Ukrainian Microwave Week. IEEE 6th International Symposium on Microwaves, Radar and Remote Sensing (MRRS), 2020.
- Atomic wavelets in lossy and near-lossless image compression,Image and Signal Processing for Remote Sensing, 2020.
- Discrete Atomic Compression with Different Structures of Discrete Atomic Transform: Efficiency Comparison and Perspectives of Application to Digital Images Privacy Protection, 11th IEEE International Conference on Dependable Systems, Services and Technologies, DESSERT’2020, 14-18 May, 2020, Kyiv, Ukraine
- Discrete Atomic Compression of Digital Images: a Way to Reduce Memory Expenses, International Scientific and Technical Conference "Integrated Computer Technologies in Mechanical Engineering" Synergetic Engineering, Kharkiv, Ukraine, November 28-30, 2019
- On some applications of atomic functions and their generalizations, International Conference "Geometry, Differential Equations and Analysis" in memory of Aleksei Vasilyevich Pogorelov to emphasize his great contribution to Geometry, Geometric Partial Differential Equations and to celebrate his 100th birthday anniversary, Kharkiv, Ukraine, June 17 - 21, 2019.
- Application of atomic functions to image compression, II International Conference "ProfIT Conference", Kharkiv, Ukraine, 2019
- Generalized Fup-functions and their applications, VI International Conference “ANALYSIS AND MATHEMATICAL PHYSICS” dedicated to the centennial anniversary of the National Academy of Sciences of Ukraine and the 50th anniversary of the Department of Function Theory, Kharkiv, 2018
- Approximation of periodic functions by generalized Fup-functions, V International Conference “Analysis and Mathematical Physics” dedicated to Vladimir A. Marchenko’s 95th birthday and the centennial anniversary of the National Academy of Sciences of Ukraine, Kharkiv, 2017
- Compactly supported solutions of some functional differential equations and their applications to approximation theory, 5th International Conference for Young Scientists on Differential Equations and Applications dedicated to Yaroslav Lopatynsky, 9-11 November, 2016, Kyiv
- Application of Atomic Functions to Lossy Image Compression, 5th International Scientific Conference of Students and Young Scientists “Theoretical and Applied Aspects of Cybernetics”, Kyiv, Ukraine, November 23-27, 2015
- Asymptotics of the basic functions of generalized Taylor series for the classes Hs,, III Interna-

tional Conference “Analysis and Mathematical Physics”, Kharkiv, Ukraine, June 15 – 19, 2015
- Approximation properties of the generalized Fup-functions, II International Conference “Analysis and Mathematical Physics”, Kharkiv, Ukraine, June 16 – 20, 2014
- Almost-trigonometric basis theorem, International Mathematical Conference “Differential Equations, Numerical Methods, Function Theory and Mathematical Methods of Mechanics” Devoted to 100 Anniversary of Corresponding Member of NAS of Ukraine Polozhiy G.M., Kyiv, Ukraine, April 23 – 24, 2014
- On the asymptotics of the generalized Fup-functions, International School-Conference “Tarapov Readings-2013”, Kharkiv, Ukraine, 29 September – 4 October, 2013
- Applications of the function mups(x), 8th International ISAAC Congress 2011, Moscow, Russia, August 22-27, 2011
- On the nonstationary wavelet system, International student, postgraduate and young scientist conference “Lomonosov - 2011”, Moscow, Russia, April 11-15, 2011
- Asymptotics of the basic functions of the generalized Taylor series for functions of some nonquasianalytic classes, International Conference “Contemporary problems of mathematics and its application in natural sciences and information technologies”, Kharkiv, Ukraine, April 17-22, 2011
- On the nonstationary wavelet system, XIII International Scientific Conference Devoted to the memory of academician M. Kravchuk, Kyiv, Ukraine, May 13-15, 2010
- Approximation properties of spaces of linear combinations of shifts of atomic functions, International Conference “Approximation Theory”, St. Petersburg, Russia, May 6-8, 2010
- On approximation properties of spaces of linear combinations of shifts of the function mup2(x), Conference “Functional Methods in Approximation Theory and Operator Theory III”, Volyn, Ukraine, August 22-26, 2009
- Asymptotics of basic functions of generalized Taylor series for some function class, International student, postgraduate and young scientist conference “Lomonosov - 2009”, Moscow, Russia, April 13-18, 2009
- On the asymptotics of basic functions of generalized Taylor series for some function class, XII International Scientific Conference Devoted to the memory of academician M. Kravchuk, Kyiv, Ukraine, May 15-17, 2008

TEACHING ACTIVITIES:

Courses Taught:
Calculus, Linear Algebra, Analytic Geometry, Probability Theory, Statistics, Stochastic Processes, Algorithms and Complexity Analysis, Deep Learning, Machine Learning and Data Analysis

Author Courses, Academic Programs:
Algorithms and Complexity Analysis, Deep Learning, Machine Learning and Data Analysis

Methodological Materials, Textbooks:
- Methods of system analysis in financial and actuarial mathematics (in Russian), N.Ye. Zhukovsky National Aerospace University “Kharkiv Aviation Institute”, Kharkiv, 2017
- Matrix calculus (in Russian), N.Ye. Zhukovsky National Aerospace University “Kharkiv Aviation Institute”, Kharkiv, 2015
- Problems on linear algebra and analytic geometry (in Russian), N.Ye. Zhukovsky National Aerospace University “Kharkiv Aviation Institute”, Kharkiv, 2014
- Algorithms and Complexity Analysis (in Russian), N.Ye. Zhukovsky National Aerospace University “Kharkiv Aviation Institute”, Kharkiv, 2013
- Stochastic Processes (in Ukrainian), N.Ye. Zhukovsky National Aerospace University “Kharkiv

Aviation Institute", Kharkiv, 2009

GRANTS AND PROJECTS:

Participation in International and National Projects:

- "Methods for creating large volumes of channel images in mobile devices for basic forecasting and machine learning", 2021-2023, ДР № 0121U112176, https://nrat.ukrintei.ua/search-doc/0224U000799
- "Methods of intelligent computer processing of big data in remote sensing, multimedia and telecommunications systems", 2018-2020, ДР № 0118U003020, https://nrat.ukrin-tei.ua/searchdoc/0221U104463

Grants, Scholarships, Academic Mobility Programs:
Exploratory Research on Generative Compression for Compressive Lidar, Science & Technology Center in Ukraine (STCU) Agreement No. 7116

PROFESSIONAL ACHIEVEMENTS AND AWARDS:

Honorary Titles:
none

Distinctions, Awards, Prizes:

- "The best 2022 year talk award", the CriCTecS seminar, National Aerospace University "Kharkiv Aviation Institute", January 2023
- "Icarus KhAI - 2022: The best scientist award", National Aerospace University "Kharkiv Aviation Institute", December 2022
- The winner of the section "Information technologies, digital country and cybersecurity", X Competition of Startups "Sikorsky Challenge", August 2021, Kyiv, Ukraine
- The winner in the nomination "The best project idea", X Competition of Startups "Sikorsky Challenge", August 2021, Kyiv, Ukraine
- Finalist of Intensive program for startups "reBOOTcamp: Startup Kharkiv", October 2020, Kharkiv, Ukraine
- Award for the best paper, 11th IEEE International Conference on Dependable Systems, Services and Technologies DESSERT 2020, May, 2020
- Award of the contest "Young Innovator of Kharkiv Region", April, 2019
- Award for the Best Talk of the Session "Applied Mathematics and System Analysis" of the Second International Conference "ProfIT Conference", Kharkiv, 2019
- 3rd place in 134 Startup Battle, Kyiv, January 2019
- Award in "KhAI Innovate 2018" in the nomination "IT innovations", 2018
- M.V. Ostrogradsky scholarship for the significant achievements in science, Kharkiv, May 2017
- Award for the Best Talk of the Session "Applied Mathematics" of the 5th International Scientific Conference of Students and Young Scientists "Theoretical and Applied Aspects of Cybernetics", November 2015
- Scholarship of N.I. Akhiezer Foundation, Kharkiv Mathematical Society, March 2015
- Award of the National Academy of Sciences of Ukraine for the scientific work "Asymptotics of basic functions of the generalized Taylor series", February 2012
- Award of the Organizing Committee of the Section of Mathematics and Mechanics of the International student, postgraduate and young scientist conference "Lomonosov - 2011" for the best talk, April 2011

- Award of the Kharkiv Regional State Administration for winning the Fourth Regional contest “The Best Young Scientist of Kharkiv Region”, May 2009
- “Icarus KhAI - 2008” Award, N.Ye. Zhukovsky National Aerospace University “Kharkiv Aviation Institute”, December 2008

Membership in Professional Associations:
- The A-Methods R&D lab, https://www.amethods.net
- Public Society USIT https://usit.eu.org

INTERNATIONAL ACTIVITIES:

Internships:
none

Cooperation with Foreign Universities:
- West Pomeranian University of Technology in Szczecin, Szczecin, Poland
- University of Delaware, Newark, USA
- University of Rennes 1, Lannion Cedex, France

Teaching/Lecturing Abroad:
none

SELECTED PUBLICATIONS:

Key Articles (Scopus, WoS, others):
- Brysina I. V., Makarichev V. O. Generalized atomic wavelets // Radioelectronic And Computer Systems. – 2018. – № 1 (85). – pp. 23-31. https://www.khai.edu/csp/nauchportal/Arhiv/REKS/2018/REKS118/Brysina.pdf
- Brysina I. V., Makarichev V. O. Atomic Functions And Their Generalizations In Data Processing: Function Theory Approach // Radioeleceronic And Computer Systems. – 2018. – № 3 (87). – pp. 4-10. DOI: https://doi.org/10.32620/reks.2018.3.01
- I.V. Brysina, V.O. Makarichev. Discrete Atomic Compression of Digital Images // Radioelectronic and Computer Systems. – 2018. – No. 4 (88). – P. 17 - 33. DOI: https://doi.org/10.32620/reks.2018.4.02
- I.V. Brysina, V.O. Makarichev. Discrete Atomic Compression of Digital Images: almost lossless compression // Radioelectronic and Computer Systems. – 2019. – No. 1 (89). – P. 29 - 36. DOI: https://doi.org/10.32620/reks.2019.1.03
- V. O. Makarichev, V. V. Lukin, I. V. Brysina. On Estimates of Coefficients of Generalized Atomic Wavelets Expansions and their Application to Data Processing // Radioelectronic and Computer Systems. – 2020. – No. 1 (93). – P. 44 - 57. DOI: https://doi.org/10.32620/reks.2020.1.05
- V. Makarichev, V. Kharchenko. Application of dynamic programming approach to computation of atomic functions // Radioelectronic and Computer Systems. – 2021. – No. 4 (100). – P. 36 - 45. DOI: https://doi.org/10.32620/reks.2021.4.03
- Makarichev, V.; Vasilyeva, I.; Lukin, V.; Vozel, B.; Shelestov, A.; Kussul, N. Discrete Atomic Transform-Based Lossy Compression of Three-Channel Remote Sensing Images with Quality Control. Remote Sens. 2022, 14, 125. DOI: https://doi.org/10.3390/rs14010125
- Makarichev, V.; Lukin, V.; Illiashenko, O.; Kharchenko, V. Digital Image Representation by Atomic Functions: The Compression and Protection of Data for Edge Computing in IoT Sys-

tems. Sensors 2022, 22, 3751. https://doi.org/10.3390/s22103751

- V. O. Makarichev, V. V. Lukin, I. V. Brysina and B. Vozel, "Spatial Complexity Reduction in Remote Sensing Image Compression by Atomic Functions," in IEEE Geoscience and Remote Sensing Letters, vol. 19, pp. 1-5, 2022, Art no. 6517305, doi: https://doi.org/10.1109/LGRS.2022.3213406
- Makarichev, V.O., Lukin, V.V. and Kharchenko, V.S. 2023. Image Compression and Protection Systems Based on Atomic Functions. International Journal of Computing. 22, 3 (Oct. 2023), 283-291. Available at: https://www.computingonline.net/computing/article/view/3222
- Makarichev V, Lukin V, Brysina I. On the Impact of Discrete Atomic Compression on Image Classification by Convolutional Neural Networks. Computation. 2024; 12(9):176. https://doi.org/10.3390/computation12090176
- V. Makarichev, V. Lukin, S. Kryvenko, I. Brysina. Digital image representation by atomic functions: features for computer vision and machine learning // Aerospace Technic and Technology. - 2025. - 3. - pp. 75-95. DOI: https://doi.org/10.32620/aktt.2025.3.08

Books, Chapters in Collective Monographs:

- Makarichev, V. ., Lukin, V. ., Brysina, I. ., & Vozel, B. . (2024). Lossy Compression of Remote Sensing Images by Atomic Functions: DAC Improvements. Mathematics and Computer Science: Contemporary Developments Vol. 8, 1–25. https://doi.org/10.9734/bpi/mcscd/v8/2711

Links to Citation Database Profiles:

- https://orcid.org/0000-0003-1481-9132
- https://www.scopus.com/authid/detail.uri?authorId=41761910800
- https://scholar.google.com/citations?user=2iZZeb0AAAAJ&hl=en
- https://sciprofiles.com/profile/1987086

ADDITIONAL INFORMATION:

Language Proficiency:
Ukrainian, Russian – native, English – technical B1-B2, conference/presentations talks, papers writing/reading

IT Skills:
C/C++ (STL, Eigen), Python (NumPy, Matplotlib, Pandas, scikit-learn), TensorFlow, JavaScript, TypeScript, Datagrok

Social and Community Activities:
reviewer for Signal Processing: Image Communication, reviewer of Mathematical Reviews, referee of Visnyk HNU Mathematics, Applied Mathematics and Mechanics