

TATIANA YAKUSHKINA

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EDUCATION

PhD (2018)

Lomonosov Moscow State University
Dissertation: “Mathematical models of evolution based on replicator systems”
05.13.18 Mathematical modeling, numerical methods and software complexes
Advisor: Dr David B. Saakian

Specialist (MSc) 2011, Postgraduate program, (2014)

Lomonosov Moscow State University
Department of Computational Mathematics and Cybernetics,
Specialty: System analysis and operational research
Advisor: Dr Alexander S. Bratus

SCIENTIFIC RESEARCH INTERESTS

mathematical modeling, complex systems, differential equations, evolution models, game theory, blockchain applications

EXPERIENCE

MIIT (Moscow State University of Railway Engineering)

Assistant Lecturer (2011-2013),

Senior Lecturer (2013-2016)

Department of applied mathematics-1

Courses: System Analysis, Discrete Optimization, Mathematics (Introductory course for Management department), Probability Theory and Statistics

National Research University Higher School of Economics,

Faculty of Business and Management

Assistant Lecturer (2012-2018),

Associate Professor (2019-present)

Department of Business Process Modeling and Optimization

Courses: Business Processes Analysis and Improvement, Mathematical Modelling, Scientific Research Seminar, Methodology and Tools for Business Process Modeling

Supervised student papers and course details:

<https://www.hse.ru/en/org/persons/64808651#teaching>

OU Nuland

Chief Science Officer (part-time, 2018-present)

R&D, blockchain business models, tokenomics

RESEARCH & INTERNSHIPS

Evolutionary Genomics Research Group, National Center for Biotechnology Information (NCBI), National Library of Medicine (NLM), National Institutes of Health (NIH) (Bethesda, MD, USA)

Supervisor: Dr. Eugene Koonin

Visiting Researcher 2020 (Jan-Jul)

Laboratory of Statistical and Computational Physics, Institute of Physics, Academia Sinica, (Taipei, Taiwan)

Visiting Researcher

Supervisor: Dr. Chin-Kun Hu

2013 (March, August), 2014 (August), 2016 (July), 2017 (Jan)

Supélec (Gif-sur-Yvette, France)

HYCON-EECI Graduate School on Control 2012. Hybrid Dynamical Systems: Stability and Control (Prof. Andrew Teel)

Supélec (Gif-sur-Yvette, France)

HYCON-EECI Graduate School on Control 2011. Modeling and Analysis of Biological Networks (Prof. Moustafa Khammash)

PUBLICATIONS

1. Saakian D. B., Yakushkina T. Mutator Gene Model with Three Classes of Evolutionary States // Journal of the Physical Society of Japan. 2020. Vol. 89. P. 44801.
2. Saakian D. B., Vardanyan E., Yakushkina T. Evolutionary model with recombination and randomly changing fitness landscape // Physica A: Statistical Mechanics and its Applications. 2020. Vol. 541. P. 123091.
3. Drozhzhin, S., Yakushkina, T. and Bratus, A., 2019. Fitness Optimization and Evolution of Permanent Replicator Systems. arXiv preprint arXiv:1911.02893.
4. Saakian D. B., Yakushkina T., Koonin E. V. Allele fixation probability in a Moran model with fluctuating fitness landscapes // Physical Review E - Statistical, Nonlinear, and Soft Matter Physics. 2019. Vol. 99. P. 1-6.

5. Yakushkina, T. and Saakian, D.B., 2019. Eigen model version of evolution with directed migration. *Chinese journal of physics*, 57, pp.309-313.
6. Bratus, A.S., Yakushkina, T., Drozhzhin, S. and Samokhin, I., 2018. Mathematical models of evolution for replicator systems: fitness landscape adaptation. In Russian (Математическая биология и биоинформатика (pp. e71-1)).
7. Yakushkina T., Saakian D. B. New versions of evolutionary models with lethal mutations // *Physica A: Statistical Mechanics and its Applications*. 2018. Vol. 507. P. 470-477.
8. Bratus A., Drozhzhin S., Yakushkina T. On the Evolution of Hypercycles // *Mathematical Biosciences*. 2018. Vol. 306. P. 119-125.
9. Yakushkina T., Saakian D. B. The exact solution of the mutator model with directed mutations, linear fitness function, and finite genome length // *Chinese Journal of Physics*. 2018. Vol. 56. No. 5. P. 2235-2240.
10. Yakushkina T., Saakian D. B. Modeling Evolution on Nearly Neutral Network Fitness Landscapes // *Journal of the Physical Society of Japan*. 2017. Vol. 86. P. 084801-1-084801-6.
11. Yakushkina T., Saakian D. B. Nonlethal Fraction of Virus Population in Evolution Models with Lethal Mutations // *Journal of the Physical Society of Japan*. 2017. Vol. 86. No. 3. P. 1-5.
12. Yakushkina T. A Distributed Replicator System Corresponding to a Bimatrix Game / Пер. с рус. // *Moscow University Computational Mathematics and Cybernetics*. 2016. Vol. 40. No. 1. P. 19-27.
13. Saakian D. B., Yakushkina T., Hu C. The rich phase structure of a mutator model // *Scientific Reports*. 2016. Vol. 6
14. Yakushkina T., Saakian D. B., Bratus A., Hu C. Evolutionary games with randomly changing payoff matrices // *Journal of the Physical Society of Japan*. 2015. Vol. 84. No. 6, Article number 064802. P. 064802-1-064802-7.
15. Yakushkina T., Saakian D. B., Hu C. Exact dynamics for a mutator gene model // *Chinese Journal of Physics*. 2015. Vol. 53. No. 5-I. P. 100904-1-100904-13.
16. Ghazaryan, M., Yakushkina, T.S. and Saakyan, D.B., 2015. Exact evolutionary dynamics on multi dimensional fitness landscape. *Computer Research and Modeling*, 7(6), pp.1269-1277.

HONORS AND AWARDS

2011 Best diploma thesis award CMC

2014 Young Faculty Support Program (Group of Young Academic Professionals), Category "New Lecturers"

2018 Chinese Journal of Physics Research Paper Award

2019 Best Teacher Award (Higher School of Economics)

2020 ORISE appointment to the National Library of Medicine (NLM) National Center for Biotechnology Information (NCBI) Research Participation Program. This program is administered by the Oak Ridge Institute for Science and Education through an interagency agreement between the U.S. Department of Energy (DOE) and the National Library of Medicine (NLM).

CONFERENCES

2019 International Conference: Mathematical Modelling in Biomedicine, (Moscow, Russia).
Presentation: A.S. Bratus, I. Samochin, S. Drozhzhin, T. Yakushkina. Evolutionary adaptation of replicator system and its application to the problem of treatment cells and bacterial disease.

2019 19th International Symposium on Mathematical and Computational Biology: BIOMAT 2019, (Szeged, Hungary).
Presentation: A.S. Bratus, S. Drozhzhin, T. Yakushkina. Evolutionary adaptation of the permanent replicator system.

2019 Evolving life: the evolution with trade-offs, frustration in selection, and growing complexity, (Yerevan, Armenia).
Presentation: Fixation probability on fluctuating landscapes.

2019 Mathematical Models in Ecology and Evolution, (Lyon, France).
Presentation: Fitness Optimization in Replicator Systems Evolution.

2018 The European Conference on Mathematical and Theoretical Biology, (Lisbon, Portugal).
Presentation: Near-neutrality in evolutionary models

2017 Integrative Biology & Medicine, (Kiev, Ukraine).
Presentation: Evolutionary Models with Lethal Mutations.

2016 NCTS International Workshop on Critical Phenomena and Complex Systems, (Hsinchu, Taiwan).
Presentation: The solution of evolutionary models with lethal mutations.

2015 Mathematical Models in Ecology and Evolution, (Paris, France).
Presentation: Evolutionary games with randomly changing payoff matrices.

LANGUAGES

English – advanced (C1)
French – basic (A2)

COMPUTER SKILLS

Python, MATLAB, Mathematica, LaTeX, ARIS

REFERENCES

Dr. Alexander S. Bratus

Professor

Faculty of Computational Mathematics and Cybernetics, Lomonosov Moscow State University, Moscow, Russia

Email: alexander.bratus@yandex.ru

Dr. David B. Saakian

Theoretical Physics Research Group, Advanced Institute of Materials Science, Ton Duc Thang University, Ho Chi Minh City, Vietnam

Faculty of Applied Sciences, Ton Duc Thang University, Ho Chi Minh City, Vietnam

Email: david.saakian@tdt.edu.vn, davidsaakian@gmail.com

Dr. Alexander Gromoff

Department Head, Professor

Department of Modeling and Business Process Optimization, Faculty of Business and Management, School of Business Informatics, National Research University, Moscow Russia

Email: agromov@hse.ru