GEORGII OBLAPENKO

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Ph.D. (Mechanics of Fluid, Gas and Plasma)
Saint-Petersburg State University ⋄ Department of Hydroaeromechanics

EXPERIENCE

University of Texas at Austin July 2018 – Present
Scientific Consultant *Department of Aerospace Engineering and Engineering Mechanics*

· Development of a hybrid Discrete Velocity Method/Direct Simulation Monte Carlo code

Saint-Petersburg State University September 2015 – December 2017
Assistant engineer *Department of Hydroaeromechanics*

· Lead developer of a C++ library aimed at kinetic theory computations
· Implementation of state-to-state models in Direct Simulation Monte Carlo (DSMC) codes
· Development of simplified models for vibrational relaxation rates
· Numerical modeling of reaction rates in viscous gas flows

Saint-Petersburg State University April 2013 – September 2015
Assistant researcher *Department of Hydroaeromechanics*

· Development of theoretical models of reaction rates in viscous gas flows
· Numerical modeling of reaction rates in viscous gas flows

GODA New Media Artist Collective October 2016 – Present
Programmer, sound designer

· Design of interactive installations, concept creation
· Programming (Python, MAX/MSP, Arduino)
· Sound design, soundtrack work

Freelance September 2013 – June 2014
Web developer

· Creation of educational online games
· Creation of online interface for an interactive remote laboratory

Internships

· **DLR, Göttingen, Germany (November 2017–January 2018)**. Implementation of modern models of physico-chemical process rates in the DLR-TAU solver.
· **The Federal University of Parana, Curitiba, Brazil (October 2016).** Studied the influence of variable diameters of vibrationally excited molecules on relaxation processes.
· **Khristianovich Institute of Theoretical and Applied Mechanics, Novosibirsk, Russia (February 2016).** Worked on implementation of state-to-state models of non-equilibrium processes in DSMC code.

TECHNICAL SKILLS

Brief overview:

Computer languages	Python, C++, Fortran, Julia, MATLAB MAX/MSP, LaTeX, Javascript, HTML, CSS
Tools	Unix command-line tools, Paraview
Skills	Numerical modeling, machine learning, digital signal processing
Online profiles	https://github.com/knstmrd https://github.com/godacollective https://www.kaggle.com/kunstmord https://www.linkedin.com/in/george-oblapenko

Detailed:

Numerical modeling

- Experience in implementing various numerical algorithms in C++, Python, Fortran, Julia and MATLAB
- Well-acquainted with numerical/scientific libraries for Python (Numpy, Scipy) and C++ (Armadillo, GSL, Boost numerical libraries)

Machine learning

- Experience in working with data-processing tools, various classification and regression algorithms in Python (Pandas, scikit-learn, XGBoost, LightGBM, Catboost); experience with audio processing, text processing (NLTK, Gensim) and computer vision (OpenCV); basic knowledge of Spark, Vowpal Wabbit
- Experience with deep learning (PyTorch, Keras)
- Regular participant in Kaggle competitions (10 to date)

Kinetic theory

- Experience in application of kinetic theory to non-equilibrium flow modeling (rate coefficient and transport properties computation)
- One of the lead developers of the **KAPPA** kinetic theory library (C++)
- Experience in CFD simulations of strongly non-equilibrium reacting gas flows and implementation of various models of thermo-chemical relaxation in CFD code
- Experience in DSMC modeling of non-equilibrium rarefied gas flows and development of DSMC and Discrete Velocity Method codes

Digital Signal Processing

- Experience in DSP in Python (Librosa, YAAFE)
- Developer of a C++ library (**arma-dsp**) for DSP
- Experience in implementation of various audio processing algorithms in C++, Python, MAX/MSP

Miscellaneous

- iOS app development: basic knowledge of Swift, AudioKit, SpriteKit
- Web development: familiar with Django and Django REST framework, experience working with Javascript, React, HTML, CSS

EDUCATION

Saint-Petersburg State University *April 2017*
Ph.D. degree (in Physical and Mathematical Sciences)
Area of research: Mechanics of Fluids, Gases and Plasma
Department of Hydroaeromechanics
Research supervisor: Prof. Kustova E.V.

Saint-Petersburg State University *June 2015*
Masters degree (with excellence) in Mechanics and Mathematical Modelling
Area of specialization: Molecular Kinetic Theory of Fluids and Gases
Department of Hydroaeromechanics
Research supervisor: Prof. Kustova E.V.

Saint-Petersburg State University *June 2013*
Bachelors degree in Mathematics and Mechanics
Department of Hydroaeromechanics
Research supervisor: Prof. Kustova E.V.

RESEARCH GRANTS

Participant of 3 Saint-Petersburg University grants, 1 Russian Science Foundation grant and 3 Russian Foundation for Basic Research grants (not including personal grants).

Participant of the ESA research project "Exploring angular-momentum phenomenology in aerothermodynamics and MHD" (as a subcontractor to the DLR), 2015–2016.

Own research and travel grants:

1. Research project "Improvements of the thermo-chemical relaxation model used by the DLR-TAU code" jointly sponsored by the DAAD and Saint-Petersburg State University, 2017–2018
2. Research project "Influence of variable diameters of vibrationally excited molecules on relaxation processes in strongly non-equilibrium gas flows" jointly sponsored by the Santander Bank and Saint-Petersburg State University, 2016
3. Research project "Implementation of models of vibrational transitions in direct simulation methods", 2015–2016, sponsored by the Russian Foundation for Basic Research
4. Saint-Petersburg State University travel grants (2013, 2014, 2017)

Stipends and awards:

- Stipend of the Russian President for students and PhD students studying disciplines corresponding to the prioritized areas of modernization of Russian economics (2017)
- Stipend of the Russian Government for students and PhD students studying disciplines corresponding to the prioritized areas of modernization of Russian economics (2016)
- Stipend of the Russian Government for students and PhD students (2016)
- Winner of the Saint-Petersburg Government Grant Competition for Students and Graduate Students (2013)

PUBLICATIONS, CONFERENCE PARTICIPATION

Author and co-author of 14 publications in SCOPUS/Web of Science-indexed peer-reviewed journals, participant of 7 international and 7 all-Russian conferences.

Publications in SCOPUS/Web of Science-indexed journals:

1. *Oblapenko G.P.* Calculation of Vibrational Relaxation Times Using a Kinetic Theory Approach // The Journal of Physical Chemistry A, 2018.
2. *Campoli L., Oblapenko G.P., Kustova E.V.* KAPPA: Kinetic approach to physical processes in atmospheres library in C++ // Computer Physics Communications, 2018.
3. *Istomin V.A., Oblapenko G.P.* Transport coefficients in high-temperature ionized air flows with electronic excitation // Physics of Plasmas, 2018.
4. *Kremer G.M., Kunova O.V., Kustova E.V., Oblapenko G.P.* The influence of vibrational state-resolved transport coefficients on the wave propagation in diatomic gases // Physica A: Statistical Mechanics and its Applications, 2018.
5. *Shoev, G., Oblapenko, G., Kunova, O., Mekhonoshina, M., & Kustova, E.* Validation of vibration-dissociation coupling models in hypersonic non-equilibrium separated flows // Acta Astronautica, 2018.
6. *Kustova E.V., Mekhonoshina M.A., Oblapenko G.P.* On the applicability of simplified state-to-state models of transport coefficients // Chemical Physics Letters, 2017.
7. *Oblapenko G.P., Kashkovsky A.V., Bondar Ye.A.* State-to-state models of vibrational relaxation in Direct Simulation Monte Carlo (DSMC) // Journal of Physics: Conference Series, 2017.
8. *Kustova E.V., Oblapenko G.P.* Vibration-dissociation Coupling in Multi-Temperature Viscous Gas Flows // AIP Conference Proceedings, 2016. V. 1786. P. 150004 (1–8)
9. *Baikov B.S., Bayalina D.K., Kustova E.V., Oblapenko G.P.* Inverse Laplace Transform as a Tool for Calculation of State-specific Cross Sections of Inelastic Collisions // AIP Conference Proceedings, 2016.
10. *Shoev G.V., Bondar Ye.A., Oblapenko G.P., and Kustova E.V.* Development and testing of a numerical simulation method for thermally nonequilibrium dissociating flows in ANSYS Fluent // Thermophysics and Aeromechanics, 2016.
11. *Kustova E.V., Oblapenko G.P.* Mutual effect of vibrational relaxation and chemical reactions in viscous multitemperature flows // Physical Review E – Statistical, Nonlinear, and Soft Matter Physics, 2016.
12. *Kustova E.V., Nagnibeda E.A., Oblapenko G.P., Savelev A.S., Sharafutdinov I.Z.* Advanced models for vibrational–chemical coupling in multi-temperature flows // Chem. Phys., 2016.
13. *Kustova E.V., Oblapenko G.P.* Reaction and internal energy relaxation rates in viscous thermochemically non-equilibrium gas flows // Phys. Fluids, 2015.
14. *Kustova E.V., Oblapenko G.P.* Rates of VT Transitions and Dissociation and Normal Mean Stress in a Non-equilibrium Viscous Multitemperature N_2/N Flow // AIP Conference Proceedings, 2014.

Other publications:

1. *Kustova E.V., Oblapenko G.P., Sharafutdinov I.Z.* Vibrational relaxation models for non-equilibrium multi-temperature flows // Physico-chemical Kinetics in Gas Dynamics, 2015. Vol. 16. (In Russian)

2. *Kustova E.V., Oblapenko G.P.* Vibrational relaxation rates in multi-temperature gas flows // Physico-chemical Kinetics in Gas Dynamics, 2014. Vol. 15. P. 1-4. (In Russian)

3. *Kustova E.V., Oblapenko G.P.* Normal mean stress and rates of slow process in chemically and vibrationally non-equilibrium multi-temperature gas flows // Vestn. S.-Peterb. Univ., Ser 1, 2013. P. 111-120. (In Russian)

Conference and school participation:

1. Tallinn University course on Experimental Interaction Design (Physiological Computing Technologies for Performative Arts), 2018 (Saint-Petersburg, Russia)
2. All-Russian conference on hydroaeromechanics, dedicated to S.V. Vallander's 100th anniversary, 2017 (Saint-Petersburg, Russia)
3. International conference "7th European Conference for Aeronautics and Space Sciences", 2017 (Milan, Italy)
4. International EUCASS workshop "Aerospace Thematic Workshops: Fundamentals of Aerodynamic Flow and Combustion Control by Plasmas", 2017 (Pushkin, Russia)
5. All-Russian school-seminar "Aerophysics and physical mechanics of classical and quantum systems", 2016 (Moscow, Russia)
6. International conference "30th International Symposium on Rarefied Gas Dynamics", 2016 (Victoria BC, Canada)
7. All-Russian school-seminar "Aerophysics and physical mechanics of classical and quantum systems", 2015 (Moscow, Russia)
8. All-Russian seminar "XXIV All-Russian seminar with international partnership on jet, separation, and non-stationary flows", 2015 (Novosibirsk, Russia)
9. International conference "International Scientific Conference On Mechanics "The Seventh Polyakhonv's Reading"", 2015 (Saint-Petersburg, Russia)
10. All-Russian school-seminar "Aerophysics and physical mechanics of classical and quantum systems", 2014 (Moscow, Russia)
11. International conference "29th International Symposium on Rarefied Gas Dynamics", 2014 (Xi'an, China)
12. All-Russian conference "Modern problems in rarefied gas dynamics", 2013 (Novosibirsk, Russia)
13. International conference "9th IFAC Symposium on Advances in Control Education", 2012 (Nizhniy Novgorod, Russia)
14. All-Russian conference "XIV Conference of Young Scientists on Navigation and Motion Control", 2012 (Saint-Petersburg, Russia)

Kaggle competition participation and results

Freesound General-Purpose Audio Tagging Challenge, 2018	Top 11%
Avito Demand Prediction Challenge, 2018	Top 28%
WSDM - KKBox's Music Recommendation Challenge, 2017	Top 46%
Sberbank Russian Housing Market, 2017	Top 66%
TalkingData Mobile User Demographics, 2016	Top 60%
Liberty Mutual Group: Property Inspection Prediction, 2015	Top 55%
Otto Group Product Classification Challenge, 2015	Top 7%
Driver Telematics Analysis, 2015	Top 15%(part of a team)
Galaxy Zoo - The Galaxy Challenge, 2014	Top 48% (part of a team)
The Marinexplore and Cornell University Whale Detection Challenge, 2013	Top 23%