GEORGII OBLAPENKO

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Ph.D. (Mechanics of Fluid, Gas and Plasma)
University of Texas at Austin ⋄ Oden Institute for Computational Engineering and Sciences

EXPERIENCE

University of Texas at Austin January 2019 – Present
Postdoctoral Research Fellow *Oden Institute for Computational Engineering and Sciences*

· Development of a hybrid Discrete Velocity Method/Direct Simulation Monte Carlo code
· Rarefied gas flow modelling

University of Texas at Austin July 2018 – January 2019
Scientific Consultant *Oden Institute for Computational Engineering and Sciences*

· 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

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, Pandas) and C++ (Armadillo, GSL, Boost numerical libraries)

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

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.

PUBLICATIONS, CONFERENCE PARTICIPATION

Author and co-author of 16 publications in SCOPUS/Web of Science-indexed peer-reviewed journals, participant of 8 international and 7 all-Russian conferences.

Publications in SCOPUS/Web of Science-indexed journals:

1. *Campoli L., Oblapenko G.P., Kustova E.V.* Overview and perspectives of KAPPA library // AIP Conference Proceedings, 2019.
2. *Oblapenko G.P., Kustova E.V., Hannemann K., Hannemann. V.* Assessment of recent thermochemical relaxation models using the DLR-TAU code // AIP Conference Proceedings, 2019.
3. *Oblapenko G.P.* Calculation of Vibrational Relaxation Times Using a Kinetic Theory Approach // The Journal of Physical Chemistry A, 2018.
4. *Campoli L., Oblapenko G.P., Kustova E.V.* KAPPA: Kinetic approach to physical processes in atmospheres library in C++ // Computer Physics Communications, 2018.
5. *Istomin V.A., Oblapenko G.P.* Transport coefficients in high-temperature ionized air flows with electronic excitation // Physics of Plasmas, 2018.
6. *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.
7. *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.
8. *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.
9. *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.
10. *Kustova E.V., Oblapenko G.P.* Vibration-dissociation Coupling in Multi-Temperature Viscous Gas Flows // AIP Conference Proceedings, 2016.
11. *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.
12. *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.
13. *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.
14. *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.
15. *Kustova E.V., Oblapenko G.P.* Reaction and internal energy relaxation rates in viscous thermochemically non-equilibrium gas flows // Phys. Fluids, 2015.
16. *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. DSMC Workshop, 2019 (Santa Fe, NM, USA)
2. Workshop on Modern Inverse Problems, 2019 (Austin, TX, USA)
3. Tallinn University course on Experimental Interaction Design (Physiological Computing Technologies for Performative Arts), 2018 (Saint-Petersburg, Russia)
4. All-Russian conference on hydroaeromechanics, dedicated to S.V. Vallander's 100th anniversary, 2017 (Saint-Petersburg, Russia)
5. International conference "7th European Conference for Aeronautics and Space Sciences", 2017 (Milan, Italy)
6. International EUCASS workshop "Aerospace Thematic Workshops: Fundamentals of Aerodynamic Flow and Combustion Control by Plasmas", 2017 (Pushkin, Russia)
7. All-Russian school-seminar "Aerophysics and physical mechanics of classical and quantum systems", 2016 (Moscow, Russia)
8. International conference "30th International Symposium on Rarefied Gas Dynamics", 2016 (Victoria BC, Canada)
9. All-Russian school-seminar "Aerophysics and physical mechanics of classical and quantum systems", 2015 (Moscow, Russia)
10. All-Russian seminar "XXIV All-Russian seminar with international partnership on jet, separation, and non-stationary flows", 2015 (Novosibirsk, Russia)
11. International conference "International Scientific Conference On Mechanics "The Seventh Polyakhonv's Reading"", 2015 (Saint-Petersburg, Russia)
12. All-Russian school-seminar "Aerophysics and physical mechanics of classical and quantum systems", 2014 (Moscow, Russia)
13. International conference "29th International Symposium on Rarefied Gas Dynamics", 2014 (Xi'an, China)
14. All-Russian conference "Modern problems in rarefied gas dynamics", 2013 (Novosibirsk, Russia)
15. International conference "9th IFAC Symposium on Advances in Control Education", 2012 (Nizhniy Novgorod, Russia)
16. All-Russian conference "XIV Conference of Young Scientists on Navigation and Motion Control", 2012 (Saint-Petersburg, Russia)