Olga **Doronina**

Ph.D. Candidate | Computational Scientist

olgadoronina.github.io
linkedin.com/in/olga-doronina
github.com/olgadoronina
+1 (720) 329-9298
olga.doronina@colorado.edu
2103 Goss Cir Apt A, Boulder, CO 80302

Ph.D. candidate with 9 years of research experience in modeling and data analysis. I'm currently working on data-driven turbulence modeling using Approximate Bayesian Computation (ABC). I'm interested in data analysis, statistics, and machine learning.

Skills

Programming	Python, C, R, Bash, Matlab
Supercomputing	High Performance Computing (HPC), Unix/Linux, Parallel Computing, MPI, OpenMP
Tools	Scikit-learn, NumPy, SciPy, Matplotlib, Jupyter Notebook, ParaView, Tecplot, git
Data Analysis	Data Analysis, Quantitative Analysis, Numerical Analysis, Data Visualization, Data Extraction
Machine Learning	Machine Learning, Deep Learning, Neural Networks (NN), Bayesian Statistics, Markov Chains Monte Carlo (MCMC)
Research	Computational Fluid Dynamics (CFD), Turbulence Modeling, Simulations, Statistics, Physics, Mathematics, Numerical Methods, Technical Writing, LaTeX
Soft Skills	Organization, Teaching, Problem-Solving, Attention to Detail, Presentations

Education

2020 (Expected) **M.S./ Ph.D. Mechanical Engineering**, University of Colorado, Boulder, CO, GPA 3.83

2014 **M.S. Applied Mathematics and Physics**, Moscow Institute of Physics and Technology (MIPT, Phystech), Moscow, Russia, GPA 3.92 with honors

2012 **B.S. Applied Mathematics and Physics**, Moscow Institute of Physics and Technology (MIPT, Phystech), Moscow, Russia, GPA 3.80

Selected Courses

Machine Learning	kNNs, Naive Bayes, LogReg, SGD, SVMs, Regularization, Decision Trees, Feature Engineering
Deep Learning & NN	Convolutional Networks, Recurrent Networks, Generative Models, Graph Neural Networks
Inverse Methods	Linear Regression, SVD and Generalized Inverse, Tikhonov Regularization, Bayesian Methods
Other Courses	Markov Processes, Sensitivity Analysis, Numerical Methods

Work Experience

Present – Jan. 2017 **Graduate Research Assistant, University of Colorado, Boulder, CO**

Turbulence and Energy Systems Laboratory (TESLa)

- Created a flexible tool for turbulence model calibration utilizing Approximate Bayesian Computation (ABC) and Markov Chain Monte Carlo (MCMC).
- Developed software collaboratively in Python using version control and published code on Github.
- Automated job submission for simulation runs on a supercomputer with Bash and data extraction and data analysis with Python and Jupyter Notebooks.
- Presented research results at eight scientific conferences and co-authored two journal publications and two conference papers.

Bayesian Statistics | MCMC | Data Analysis | Data Visualization | Python | NumPy | SciPy | Matplotlib | git | Bash | HPC | Unix/Linux | CFD | Turbulence Modeling | Technical Writing | LaTeX

Jul. 2016 – Sep. 2011 **Research Assistant, Keldysh Institute of Applied Mathematics (KIAM RAS), Moscow, Russia**

Computational Aeroacoustic Laboratory

- Implemented a moving mesh algorithm for efficient simulations into an in-house code architecture using C/C++ and MPI with OpenMP.
- Analysed data using Fourier and wavelet analysis to find frequency patterns.
- Presented research results at four scientific conferences and co-authored three journal articles.

High-Performance Computing | Parallel Computing | C/C++ | MPI/OpenMP | CFD | Python | NumPy | SciPy | Matplotlib | Data Analysis | Numerical Analysis | Data Visualization | Tecplot

Jun. 2011 – Mar. 2011 **Undegraduate Reseach Assistant, Dorodnicyn Computing Centre of RAS, Moscow, Russia**

- Built and visualized a geo-database combining large amounts of environmental data from multiple sources using PostGIS and ArcGIS.

GIS | databases | SQL

Teaching Experience

Dec. 2016 – Aug. 2016 | **Teaching Assistant, University of Colorado, Boulder, CO**

Computational Methods MCEN 3030
- Held laboratory sessions and assisted students through programming assignments using Matlab
- Graded programming assignments and exams.

Finite Element Analysis MCEN 4173/5173
- Conducted laboratory sessions guiding students through tutorials in ABAQUS.
- Held office hours to help students with homework and lab assignments.

Jun. 2016 – Feb. 2015 | **Instructor of Record, Moscow Institute of Physics and Technology, Dogoprudny, Russia**

Numerical Methods I / Numerical Methods II
- Prepared lesson plans and lectured three classes of approximately 16 students each.
- Designed and evaluated practice programming assignments, homeworks, and exams.

Volunteer experience

Present – April. 2020 | **Website Developer**

teslacu.org github.com/tesla-cu/website
- Developed website for our research group adapting Hugo templates.
- Configured Github actions to build and automatically deploy the website.

Hugo | Bootstrap | GitHub Actions

Jun. 2020 | **Reviewer**
- Applied Soft Computing Journal

Jul. 2020 – May. 2012 | **Conference Student Co-Organizer**
- 70th Annual Meeting of the APS Division of Fluid Dynamics (Abstract sorting and Volunteer) (2017)
- Rocky Mountain Fluid Mechanics Research Symposium (2017, 2018, 2019, 2020)
- International Workshop "Computational Experiment in Aeroacoustics" (2012, 2014)
- CFD-weekend in Keldysh Institute of Applied Mathematics (2014, 2015)

Projects

Blind Deconvolution of Turbulent Flows Using Neural Networks Spring 2018

github.com/olgadoronina/ML_project

I used neural networks to recover velocity fields from filtered data. I applied the Extreme Learning Machine algorithm and feed-forward NNs and compared the results with regards to their accuracy and the time required to train the model.

Extreme Learning Machine | Feed-Forward Neural Networks | TensorFlow | Keras | Python

Deconvolution of turbulent flow using Convolutional Neural Networks Spring 2019

github.com/olgadoronina/CNN_project

The aim of this project was to recover the true structure of a velocity field from its coarse-grained computation using a convolutional neural network architecture.

Convolutional Neural Networks | TensorFlow | Keras | Python

Selected Publications

For more information see my Google Scholar profile

- *Parameter Estimation for Subgrid-Scale Models Using Markov Chain Monte Carlo Approximate Bayesian Computation*. **Doronina**, Towery, and Hamlington. Physical Review Fluids (Submitted 2020).
- *Autonomic Closure for Turbulent Flows Using Approximate Bayesian Computation*. **Doronina**, Christopher, Towery, Hamlington, and Dahm.. 2018 AIAA Aerospace Sciences Meeting (2018).
- *Turbulence Model Development Using Markov Chain Monte Carlo Approximate Bayesian Computation*. **Doronina**, Towery, Christopher, Grooms, and Hamlington. 47th AIAA Fluid Dynamics Conference (2017).
- *Simulating Aerodynamics of a Moving Body Specified by Immersed Boundaries on Dynamically Adaptive Unstructured Meshes*. Abalakin, Bakhvalov, **Doronina**, Zhdanova, Kozubskaya. Mathematical Models and Computer Simulations (2019).
- *Numerical study of acoustic radiation dynamics of a Rankine vortex*. **Doronina**, Bakhvalov, Kozubskaya. Acoustical Physics (2016).