1 Bethel Valley Rd, Bldg. 4100
Oak Ridge, TN 37830
USA
reshniakv@ornl.gov
vreshniak.github.io
viktorreshniak

# Viktor Reshniak

## Education

2012–2017 **PhD in Computational Science**, *Middle Tennessee State University*.

2012–2016 **M.S. in Computer Science**, *Middle Tennessee State University*.

2011–2012 **M.S. in Thermal Physics**, *Dnipropetrovsk National University*, Ukraine.

2007–2011 **B.S. in Heat engineering**, *Dnipropetrovsk National University*, Ukraine.

## Professional experience

2017–2019 **Postdoctoral Research Associate**, *Computational and Applied Mathematics Group*, Oak Ridge National Laboratory.

2012–2017 **Graduate Teaching Assistant**, *Department of Mathematics*, Middle Tennessee State University.

## Programming skills

Languages FORTRAN, C/C++, Python, MATLAB

HPC MPI, OpenMP, Pthreads, Cuda

Miscellaneous Linux, Bash scripting, TensorFlow, LaTeX

## Languages

English Professional working proficiency

Ukrainian Native

Russian Native

## Research interests

Uncertainty quantification, numerical methods for stiff stochastic differential equations, numerical methods for nonlocal and fractional PDEs, machine learning algorithms, compressive sensing, image processing, computational mechanics.

## Research projects

December 2017 – curr. **Toolkit for Adaptive Stochastic Modeling and Non-Intrusive ApproximatioN**, *PI: Miroslav Stoyanov*, Oak Ridge National Laboratory.
I am working on enhancing and testing the FORTRAN interface module. I also contribute to the CUDA acceleration of the base C++ code.

March – May 2018 **Ugly Data Days Competition**, Oak Ridge National Laboratory.
This short interdisciplinary project involved researchers from the Spallation Neutron Source (SNS) and Computational and Applied Math (CAM) group at ORNL. The goal was to analyze the large volume of strain data collected from the SNS target modules with the idea of using it to monitor damage to the mercury vessel and to improve the design of future targets. This project won the competition (`https://datadays.pages.ornl.gov`), I contributed to the selection and numerical implementation of the data analysis tools.

September 2015 – May 2016 **Efficient numerical methods for systems of multidimensional nonlinear time dependent PDEs**, *PI: Abdul Khaliq*, Middle Tennessee State University.
The objective of this NSF grant proposal was to design a highly efficient and accurate numerical scheme by incorporating Krylov subspace approximation and WENO scheme into locally extrapolated exponential time differencing scheme for the numerical solution of the large system of ordinary differential equations that result from the discretization of multidimensional nonlinear advection-diffusion-reaction systems. I contributed to the stability analysis of the scheme and to the numerical implementation.

June – August 2014 **Acceleration of the multilevel Monte Carlo method in application to PDEs with random input data**, *PI: Clayton Webster*, Oak Ridge National Laboratory.
I developed the acceleration technique based on the learning of initial guesses to iterative linear solvers from the previously calculated data and performed the asymptotic cost analysis of the accelerated method.

2011 – 2012 **Mathematical models of potential theory for continuum medium processes with multiscale and localized effects**, *PI: Dmytro Yevdokymov*, Dnipropetrovsk National University, Ukraine.
The project was devoted to the construction of mathematical models of multiphase flows using Lagrangian description of the solid phase and integral representations of the potential theory describing the main fluid phase. My contribution was in the numerical implementation of the proposed models.

## Presentations

### Minisymposium talks

2017 **Acceleration of the Multilevel Monte Carlo method for certain classes of differential systems**, *2017 SIAM CSE*, Atlanta, GA.

2016 **Split-step methods for stiff stochastic differential systems with multiple jumps**, *2016 SIAM UQ*, Lausanne, Switzerland.

2014 **Split-step Milstein methods for multi-channel stiff stochastic differential systems**, *2014 SIAM UQ*, Savannah, GA.

### Contributed talks

2015 **Fully implicit Runge-Kutta methods for multi-channel stiff stochastic differential systems with jumps**, *2015 SIAM CSE*, Salt Lake City, Utah.

2014 **Split-step balanced Milstein methods for multi-channel stiff stochastic differential systems**, *2014 SIAM Annual Meeting*, Chicago, IL.

### Poster presentations

2018 **Slow-scale split-step tau-leaping methods for stiff stochastic chemical systems**, *2018 SIAM UQ*, Orange County, CA.

2015 **Split-step methods for stochastic partial differential equations**, *Workshop "Numerical methods for large-scale nonlinear problems and their applications"*, ICERM, Brown University.

2015 **Fully implicit Runge-Kutta methods for multi-channel stiff stochastic differential systems with jumps**, *2015 SIAM CSE*, Salt Lake City, Utah.

2014 **Balanced split-step methods for stiff multiscale stochastic systems with uncertainties**, *2014 SIAM UQ*, Savannah, GA.

### Colloquium talks

February, 2018 **Sparse approximation of nonlocal operator equations via compressed sensing**, *CAM seminar*, Oak Ridge National Laboratory.

March, 2017 **Reducing computational cost of the Multilevel Monte Carlo method by selection of suitable pathwise integrators**, *CAM seminar*, Oak Ridge National Laboratory.

June, 2016 **Acceleration of the Multilevel Monte-Carlo method for certain classes of differential systems**, *CAM seminar*, Oak Ridge National Laboratory.

## Additional training

May, 2018 **7th International Conference on Computational Harmonic Analysis**, *Vanderbilt University*, Nashville, TN.

September, 2015 **Workshop "Numerical methods for large-scale nonlinear problems and their applications"**, *Brown University* , Providence, RI.

June, 2014 **Short course on uncertainty quantification**, *Stanford University*, Stanford, CA.

## Publications


[1] V. Reshniak, A.Q.M. Khaliq, D.A. Voss, and G. Zhang. Split-step Milstein methods for multi-channel stiff stochastic differential systems. *Applied Numerical Mathematics*, 89:1–23, 2015.

[2] Yu.A. Melnikov and V. Reshniak. A semi-analytical approach to Green's functions for heat equation in regions of irregular shape. *Engineering Analysis with Boundary Elements*, 46:108–115, 2014.

[3] V Reshniak. Some Further Developments in the Infinite Product Representation of Elementary Functions. *Global Journal of Science Frontier Research*, 13, 2013.


## Manuscripts submitted to refereed journals


[1] V. Reshniak, A. Khaliq, and D. Voss. *Slow-scale split-step tau-leap method for stiff stochastic chemical systems*.

[2] V. Reshniak and Yu.A. Melnikov. *Method of Green's potentials for elliptic PDEs in domains with random boundaries*.