Artur Safin

Contact

Swiss Federal Institute of Aquatic Science and Technology
Systems Analysis, Integrated Assessment and Modelling
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Research Interests

I am interested in parallel computing, numerical PDEs and uncertainty quantification.

Education

Dec 2018 — Ph.D. in Applied Mathematics (GPA 3.77),
University of Texas at Dallas, Richardson, TX
Dissertation: "Modeling Trace Gas Sensors with the Coupled Pressure-Temperature Equations"
Advisors: Susan Minkoff and John Zweck

May 2012 — B. Sc. in Mathematics with a minor in Physics,
University of Texas at Dallas, Richardson, TX

Computer Skills

- Languages: `C/C++`, `MATLAB`, `Python`, LaTeX.
- **Parallel computing** on a cluster (TACC Stampede system at UT Austin).
- Software/packages: `deal.II`, `PETSc`, `Trilinos`, `FEniCS`, `gmsh`, `git`.
- Operating systems: Linux, Mac, Windows.

Professional Experience

2018 - Current — Postdoctoral researcher at the Swiss Federal Institute of Aquatic Science and Technology
Dübendorf, Switzerland
Work supported by NSF grant No. 1620293, titled "Multiphysics Modeling and Analysis of Thermo-Visco-Acoustic Equations with Applications to the Design of Trace Gas Sensors."

Summer 2014 — R & D Intern at Baker Hughes Inc., Houston, TX
Derived and numerically evaluated an analytical formula for gamma-ray attenuation in casing environment using direct and singly-scattered photons. Analyzed SpectraLog code for improving energy correction of gamma spectra.

2016 - 2018	Research Assistant at University of Texas at Dallas Richardson, TX Work supported by NSF grant No. 1620293, titled "Multiphysics Modeling and Analysis of Thermo-Visco-Acoustic Equations with Applications to the Design of Trace Gas Sensors."
Summer 2014	R & D Intern at Baker Hughes Inc., Houston, TX Derived and numerically evaluated an analytical formula for gamma-ray attenuation in casing environment using direct and singly-scattered photons. Analyzed SpectraLog code for improving energy correction of gamma spectra.
Summer 2013	R & D Intern at Baker Hughes Inc., Houston, TX Performed a study for the feasibility of using high-energy cosmic rays for reservoir monitoring. Analyzed a method for improving SpectraLog gamma ray analysis to reduce distortions due to Compton scattering. Studied a series of non-parametric statistical tests for estimating correlation between gamma-ray spectra. Conducted sensitivity analysis for FLEX data.

Teaching Experience

Jan 2014 - Dec 2015	Teaching Assistant at University of Texas at Dallas, Richardson, TX
Nov 2011 - Dec 2013	Math Lab Tutor at University of Texas at Dallas, Richardson, TX

Other Experience

- *Minisymposium organizer* (joint with Susan Minkoff): "Parallelizable Preconditioners and Iterative Solvers" at the SIAM Conference on Computational Science and Engineering in Atlanta, GA., Feb 27 - Mar 3, 2017.
- *Reviewer* for Geophysical Journal International (2017).
- *Manager* of the Dallas Chess Team for the US/Pro Chess League (2013–2017). League finalists in 2014, semi-finalists in 2015. Western division winners in 2014 and 2015.

Languages

- English (fluent), Russian (fluent), Spanish (basic).

Publications and Proceedings

- **A. Safin**, S. E. Minkoff, and J. Zweck, "A Preconditioned Finite Element Solution of the Coupled Pressure-Temperature Equations Used to Model Trace Gas Sensors," *SIAM Journal on Scientific Computing*, vol. 40, no. 5, pp. B1470B1493, 2018.
- J. Kaderli, J. Zweck, **A. Safin**, and S. E. Minkoff, "An analytic solution to the coupled pressure-temperature equations for modeling of photoacoustic trace gas sensors", *Journal of Engineering Mathematics*, Vol. 103, pp. 173–193, 2017.

- Q. Zhang, **A. Safin**, F. Mendez, J. Longo, A. Mezzatesta, M. Vasilyev, and S. Bliven, An Analytical Model to Evaluate Gamma Ray Attenuation Effects in Cased-Hole Logging Environment, *Proceedings of the Mathematics and Computations, Supercomputing in Nuclear Applications and Monte Carlo Conference*, Nashville, TN, Apr 22–25, 2015.
- Q. Zhang, F. Mendez, J. Longo, A. Mezzatesta, M. Vasilyev, S. Bliven, and **A. Safin**, A Monte Carlo Model of Elemental Analysis Using a Natural Gamma-Ray Spectroscopy Tool, *Proceedings of the Mathematics and Computations, Supercomputing in Nuclear Applications and Monte Carlo Conference*, Nashville, TN, Apr 22–25, 2015.

Conference Presentations

- **A. Safin**, J. Zweck, and S. Minkoff, "Using the `deal.II` and `PETSc` Packages to Solve Multi-Physics Problems for Trace Gas Sensor Modeling", *Scientific Software Days Conference*, Austin, TX, Apr 26–27, 2018 [poster].
- **A. Safin**, J. Zweck, and S. Minkoff, "A Preconditioning Scheme for Finite Element Solution of the Coupled Pressure-Temperature Equations Used for Modeling Trace Gas Sensors", *International Conference on Preconditioning Techniques for Scientific and Industrial Applications*, Vancouver, Canada, Jul 31–Aug 2, 2017.
- **A. Safin**, J. Zweck, and S. Minkoff, Accurate Finite Element Solution of the Fully Coupled Thermoacoustic Equations for Modeling of Trace Gas Sensors, *SIAM Conference on Computational Science and Engineering*, Atlanta, GA, Feb 27–Mar 3, 2017.
- Q. Zhang, **A. Safin**, F. Mendez, J. Longo, A. Mezzatesta, M. Vasilyev, S. Bliven, An Analytical Model to Evaluate Gamma Ray Attenuation Effects in Cased-Hole Logging Environment, *Mathematics and Computations, Supercomputing in Nuclear Applications and Monte Carlo Conference*, Nashville, TN, Apr 22–25, 2015.
- Q. Zhang, F. Mendez, J. Longo, A. Mezzatesta, M. Vasilyev, S. Bliven, **A. Safin**, A Monte Carlo Model of Elemental Analysis Using a Natural Gamma-Ray Spectroscopy Tool, *Mathematics and Computations, Supercomputing in Nuclear Applications and Monte Carlo Conference*, Nashville, TN, Apr 22–25, 2015.

Other Presentations

- "Modeling Trace Gas Sensors with the Coupled Pressure-Temperature Equations", *The Innovative Computing Laboratory, University of Tennesseee*, Knoxville, TN, May 30, 2018 [*Invited*].
- "Analytic Estimation of Gamma Ray Attenuation in a Cased-Hole Environment", *Department of Mathematics, The University of Texas at Dallas*, March 24, 2015 [*Colloquium*].

Workshops Attended

- `deal.II` Users and Developers Workshop, Texas A&M University, College Station, TX, August 3–7, 2015.